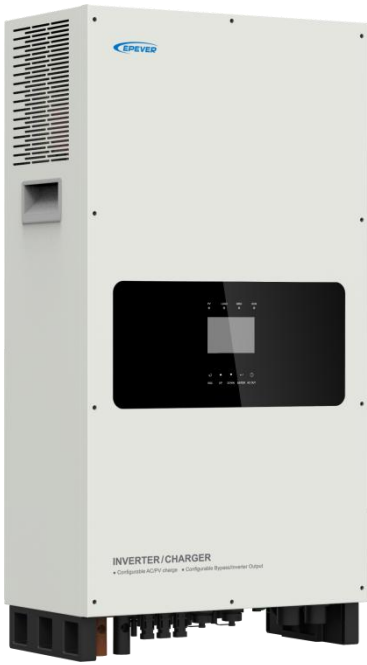
Inverter/charger

User Manual



MP3043-1020P65

MP5043-1020P65

Contents

Important Safety Instructions

Please reserve this manual for future review.

This manual contains all the safety, installation, and operation instructions for the MP-P65 series solar inverter/charger ("inverter/charger" referred to as this manual).

1. Explanation of symbols

To enable users to use the product efficiently and ensure personal and property safety, please read the related words carefully when you encounter the following symbols in the manual.

Symbol	Definition
Tip	Indicates any practical advice for reference
	**IMPORTANT:** Indicates a critical tip during the operation, if ignored, may cause the device to run in error.
	**CAUTION:** Indicates potential hazards, if not avoided, may cause the device damage.
	**WARNING:** Indicates the danger of electric shock, if not avoided, would cause casualties.
	**WARNING HOT SURFACE:** Indicates the risk of high temperature, if not avoided, would cause scalds.
	Read the user manual carefully before any operation.

 **WARNING:**	The entire system should be installed by professional and technical personnel.

2. Requirements for professional and technical personnel

- Professionally trained.
- Familiar with related safety specifications for the electrical system.
- Read this manual carefully and master related safety cautions.

3. Professional and technical personnel is allowed to do

- Install the inverter/charger to a specified location.
- Conduct trial operations for the inverter/charger.
- Operate and maintain the inverter/charger.

4. Safety cautions before installation

CAUTION	When receiving the inverter/charger, please check if there is any damage in transportation. If you find any problem, please contact the transportation company or our company in time.
CAUTION	• When installing or moving the inverter/charger, follow the instructions in the manual. • When installing the inverter/charger, end-users must evaluate whether the operation area exists arc danger.
WARNING	• Keep the inverter/charger out of the reach of children.

5. Safety cautions for mechanical installation

WARNING	• Before installation, confirm the inverter/charger has no electrical connection. • Ensure enough heat dissipation space for the inverter/charger before installation. • Do not install the inverter/charger in humid, salt spray, corrosion, greasy, flammable, explosive, dust accumulative, or other severe environments.

6. Safety cautions for electrical connection

CAUTION	• Check whether wiring connections are tight to avoid the danger of heat accumulation due to loose connections. • The inverter/charger shell shall be connected to the ground. The cross-section of the connection wire should not be less than 4mm^2 • A fast-acting fuse or breaker, whose rated current is twice the inverter/charger rated input current, should be used between the battery and the inverter/charger. • DO NOT put the inverter/charger close to the flooded lead-acid battery because the sparkle in the terminals may ignite the hydrogen released by the battery.
WARNING	• The AC output terminal is only for the load connection. Do NOT connect it to another power source or Utility. Otherwise, the inverter/charger will be damaged. Turn off the inverter/charger when connecting loads. • It is strictly forbidden to connect a transformer or a load with a surge power (VA) exceeding the overload power at the AC output port. Otherwise, damage will be caused to the inverter/charger. • Both the utility input and AC output are of high voltage, do not touch the wiring connection to avoid electric shock.

7. Safety cautions for inverter/charger operation

 **WARNING HOT SURFACE**	When the inverter/charger works, the shell will generate much heat, and the temperature is very high. Please do not touch it, and keep it far from the equipment susceptible to high temperature.
 **CAUTION**	• When the inverter/charger is working, please do not open the inverter/charger cabinet to operate. • When eliminating the fault that affects the safety performance of the inverter/charger or disconnecting the DC input, turn off the inverter/charger switch and operate it after the LCD is completely OFF.

8. The dangerous operations would cause an electric arc, fire, or explosion.

- Touch the wire end that hasn't been insulation treated and may be electriferous.
- Touch the wiring copper row, terminals, or internal devices that may be electriferous.
- The connection of the power cable is loose.
- Screw or other spare parts inadvertently falls into the inverter/charger.
- Improper operations are carried out by untrained non-professional or technical personnel.

 **WARNING**	Once an accident occurs, it must be handled by professional and technical personnel. Improper operations would cause more serious accidents.

9. Safety cautions for stopping the inverter/charger

- First, turn off the AC output and disconnect the utility input breakers. Then, turn off the DC switch.
- After the input and output wires are disconnected for ten minutes, the internal conductive modules can be touched.
- No maintenance parts in the inverter/charger. If maintenance service is required, please get in touch with our after-sales service personnel.

 **WARNING**	Do NOT touch or open the shell after the inverter/charger is powered off within ten minutes.

10. Safety cautions for inverter/charger maintenance

- It is recommended to check the inverter/charger with testing equipment to ensure there is no voltage and current in the input terminal.
- When conducting the electrical connection and maintenance, post a temporary warning sign or put up barriers to prevent unrelated personnel from entering the electrical connection or maintenance area.

- Improper maintenance of the inverter/charger may cause personal injury or equipment damage;
- It is recommended to wear an antistatic wrist strap or avoid unnecessary contact with the circuit board.

 **CAUTION**	The safety mark, warning label, and nameplate on the inverter/charger should be visible, not removed or covered.

11. Working temperature

- Working temperature range: -20℃ to +55℃ (when the working temperature exceeds 25℃, the charging power and load power will be reduced appropriately. 100% load output is not supported.)
- Storage temperature range: -40℃ to +60℃ (No sharp temperature changing)
- Relative humidity: < 95% (Non-condensing)
- Altitude: < 4000m (If the altitude exceeds 1000 meters, the actual output power is reduced appropriately.)

 **WARNING**	The inverter/charger is strictly prohibited from being used in the following places. And our company shall not be liable for any damage caused by being used in an inappropriate place. • Do not install the inverter/charger in the flammable, explosive, dust accumulative, or other severe environments. Avoid direct sunlight and rain infiltration when installing it outdoors. • DO NOT install the inverter/charger and flooded lead-acid battery in a sealed space. Otherwise, a fire may cause when the terminals produce sparks, and it ignites the flammable gas released by the battery.

Disclaimers

The warranty does not apply to the following conditions:

- Damage caused by improper use or inappropriate environment (it is forbidden to install the inverter/charger in the flammable, explosive, dust accumulative, or other severe environments).
- The actual current/voltage/power exceeds the limit value of the inverter/charger.
- Damage caused by working temperature exceeding the rated range.
- Arc, fire, explosion, and other accidents caused by failure to follow the inverter/charger stickers or manual instructions
- Unauthorized dismantling or attempted repair.
- Damage caused by force majeure such as lightning strike, power grid surge, flood and earthquake.
- Damage occurred during transportation or handling.

1 General Information

1.1 Overview

MP-P65 series,upgrade hybrid inverter/chargers that support utility charging, oil generator charging①, solar charging, utility output, inverter output, 120VAC/240VAC split-phase output.

This series also support multiple inverters/chargers (up to 6) for extended parallel operation through single-phase or three-phase parallel connection. The output voltage is 110 to 120VAC or 220 to 240VAC as for single-phase parallel connection and the output voltage is 380VAC to 415VAC as for three-phase parallel connection.

The DSP chip in the product with an advanced control algorithm brings high response speed and conversion efficiency. In addition, this product adopts an industrial design to ensure high reliability and features multiple charging and output modes.

Adopt the three-stage charging method (Bulk Charging, Constant Charging, and Float Charging) to ensure battery safety.

The 3.5 inches lattice LCD screen shows the operational status and full parameters.

The communication interface with the standard Modbus protocol allows end-users to expand their applications and is suitable for different monitoring requirements.

The new optimized MPPT tracking technology can fast-track the PV array's max power point in various situations and obtain the maximum energy in real time.

Adopting the advanced control algorithm, the AC to DC charging process brings the full digital PFC and dual closed-loop voltage-current control. It enables the input power factor close to 1 and improves the control accuracy.

The fully smart digital DC to AC inverting process adopts the advanced SPWM technology, outputs a pure sine wave, and converts the DC power to AC power. It is suitable for household appliances, power tools, industrial equipment, audio systems, and other electronics.

End-users can choose energy sources according to actual needs to maximize solar energy utilization and flexibly take the Utility as a supplement in the hybrid system. This inverter/charger provides high-quality, high-stability, and high-reliability electric energy to the end-users by improving the solar system's power supply efficiency.

Features

- Full intelligent digital energy storage equipment.

- Support battery mode or non-battery mode.
- Non-battery mode: simultaneously charging with solar (Main) and Utility (Assist).
- Advanced SPWM technology and pure sine wave output.
- PFC technology with high power factor to reduce the grid usage, low harmonic content of AC current.
- Adopt the bidirectional isolation topology, with high safety, reliability, and impact resistance.
- Advanced MPPT technology, with efficiency no less than 99.5%.
- Bypass automatic switching function (automatic switch to utility mode if the utility power is normal).
- Battery voltage controls the dry contact to turn on/off the external equipment.
- Equipped with 120V/240V split-phase output function.
- Equipped with USB-A 3.0 parallel communication interface to achieve parallel operation of up to 6 units inverter/chargers, improving the output load capacity.
- AC output supports single-phase and three-phase parallel connection (at least 3 equipment).
- Anti-surge design for the input terminal, meeting the surge limitation of the lithium battery, and avoiding dangerous surge current generated by connection or power up.
- Lightning protection circuit for the Utility input terminal.
- Equipped with EMC protection design.
- Customized charging limited current and discharging limited current.
- Customized Utility charging current.
- Multiple LED indicators show system status in real-time.
- AC OUT button controls the AC output directly.
- 3.5 inches lattice LCD screen with a rich user setting interface to monitor and modify system parameters.
- Remote battery temperature sampling and temperature compensation feature for batteries.
- Optional 4G, WiFi, or Bluetooth module to remote control the inverter/charger by the RS485 com. port.
- Three-stage charging method to ensure battery safety.
- Equipped with BMS port to perform charging and discharging control based on the BMS.
- Comprehensive electronic protection.
- With low-voltage automatic power off function, to ensure the safety and life of the battery ②.
- Time for switching from Utility bypass output to inverter output ≤10ms; time for switching from inverter

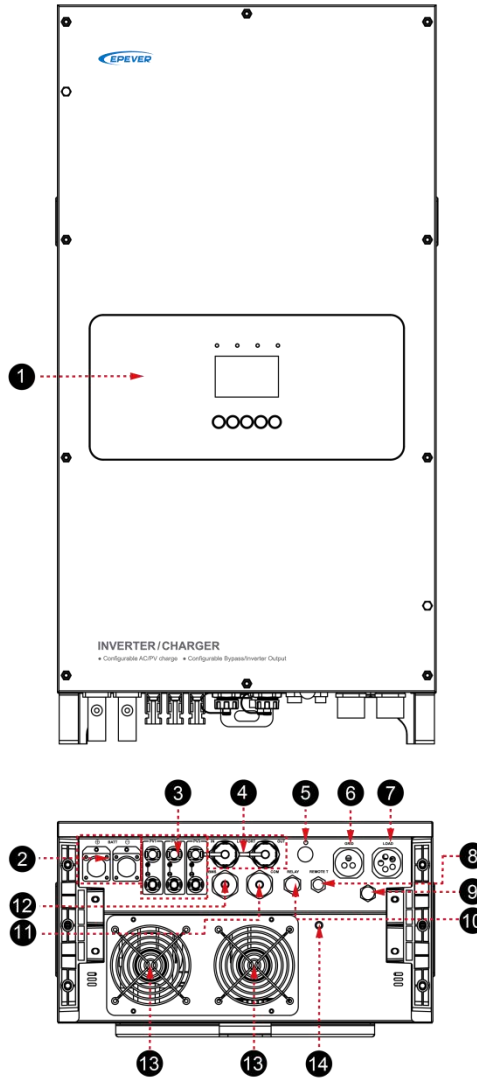
output to Utility bypass output ≤1ms.

- With battery activation function (PV, Utility can be activated).

① MP-P65 series, when using the oil engine as AC input, can be compatible with most oil engines on the market.

② For a long time and do not use the machine and the machine is in standby mode, when the battery voltage is lower than the minimum input voltage range (36VDC), the machine will automatically cut off all power supply system and to ensure the safety of storage battery life.After the Utility or PV connected, inverter/charger will activate the battery again.

1.2 Appearance



Note: The product appearance and wiring terminals of MP3043-1020P65 and MP5043-1020P65 are the same. The terminals of MP3043-1020P65 are used as an example to be introduced above.

No.	Instruction	No.	Instruction
❶	LCD (see chapter 2)	❽	Temperature sampling port of remote battery(2)
❷	Battery input terminal	❾	Air hole
❸	PV input terminal	❿	Dry contact port(3)
❹	Multi-machine parallel connection input port (USB-A 3.0, isolation design)	⓫	RS485 communication port (USB-A 3.0, with isolation design)(4) 5VDC/1.2A
❺	Inverter/charger power switch	⓬	BMS communication port (USB-A 3.0, with isolation design)(5)
❻	AC input port	⓭	Cooling fan
❼	AC output port(1)	⓮	Grounding terminal

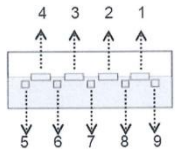
(1) 120V or 240V AC power can be obtained by connecting different pins of the AC output port.

(2) The battery temperature at 25℃ by default without temperature compensation when the remote temperature sensor is not connected or is damaged.

(3) Dry contact specification: 5A@250VAC, 10A@125VAC, 3A@30VDC.

Function: The dry contact port is connected with the generator switch to turn on/off the generator.

(4) Connecting with the RS485 communication port, an optional 4G, WiFi, or Bluetooth module can remote control the inverter/charger. The pins of the RS485 and BMS communication port (USB-A 3.0 female base) are defined as follows:



Pin	Definition	Colour	Instruction
1	VBUS	Red	Power (5VDC/1.4A)
2	D-	White	Data transmission (D-)
3	D+	Green	Data transmission (D+)
4	GND	Black	Power ground
5	RS485-A1	Blue	RS485-A1 (to transfer data with cloud platform, APP, PC software, display screen and so on)
6	RS485-B1	Yellow	RS485-B1 (to transfer data with cloud platform, APP, PC

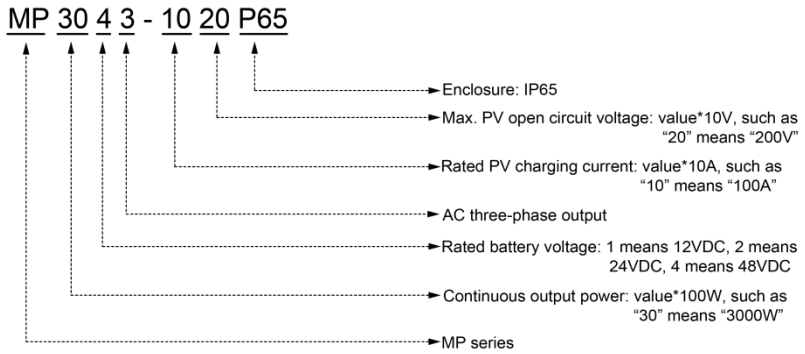
			software, display screen and so on)
7	GND2	Brown	Power ground 2
8	RS485-A2	Purple	RS485-A2 (to transfer data with BMS)
9	RS485-B2	Orange	RS485-B2 (to transfer data with BMS)

(5) The Inverter/charger has a built-in BMS-Link module. Connect the lithium battery to the BMS communication port directly, and set the BMS protocol number. The BMS protocols of different lithium battery manufacturers can be converted into our company's standard ones, which can realize the communication between the inverter/charger and the BMS of other manufacturers.

The pins of the BMS communication port (USB-A 3.0) as above in (4).

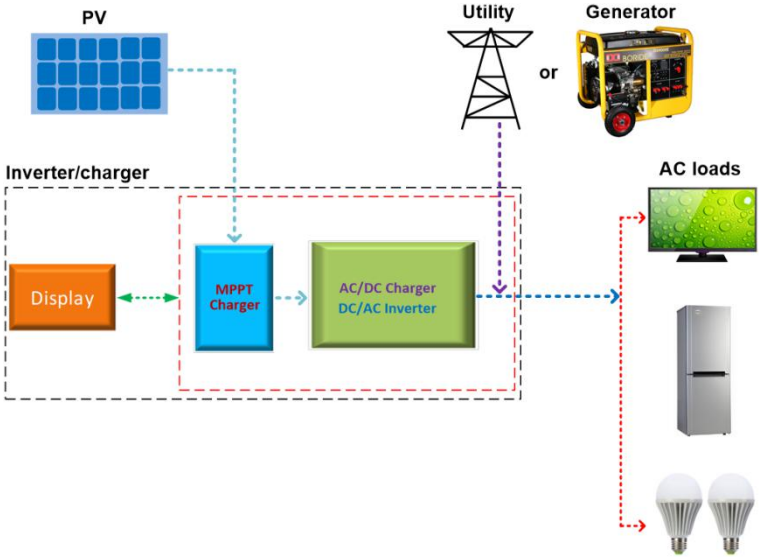
CAUTION	The currently supported BMS manufacturers and the corresponding parameters,please refer to the EPEVER's official website for check or download.

1.3 Naming rules

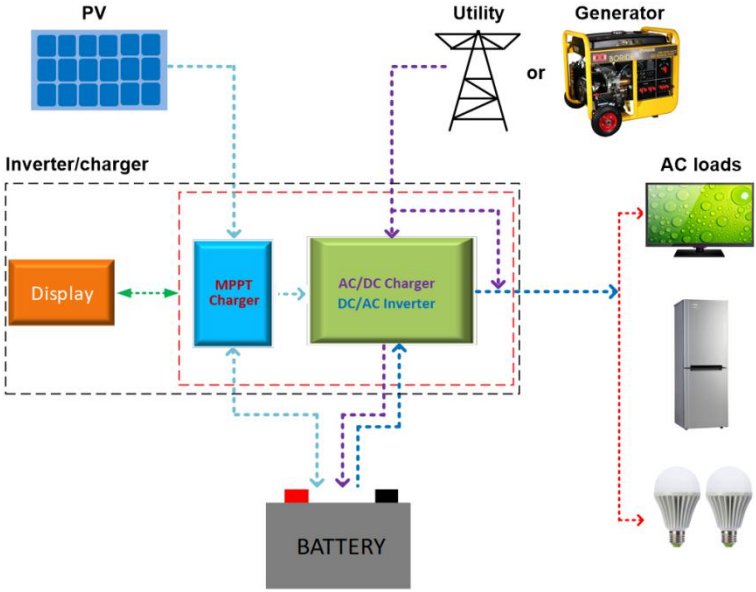


1.4 Connection diagram

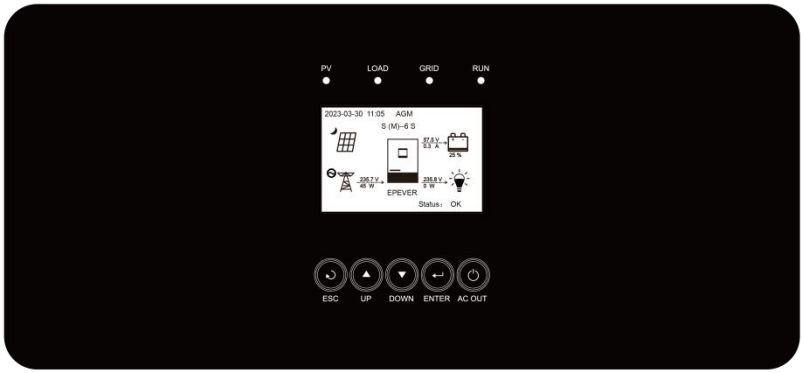
- **No battery mode**



- **Battery mode**



2 Interface



Note: The display screen can be viewed clearly when the angle between the end-user's horizontal sight and the display screen is within 90°. If the angle exceeds 90°, the information on the display screen cannot be viewed clearly.

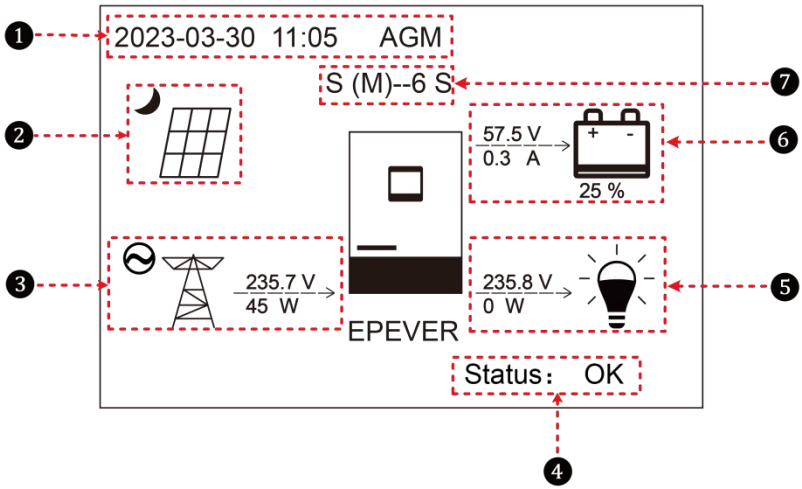
2.1 Indicator

Indicator	Status	Instruction
PV	OFF	No PV input
	Green ON	PV connection normal but no charging
	Green flashing (1 Hz)	PV charging normally
	Red ON	PV charging fault
LOAD	OFF	No inverter output
	Green flashing (1 Hz)	Inverter output normal
	Green ON	Utility is in the bypass mode
	Red ON	Inverter fault
GRID	OFF	No Utility input
	Green ON	Utility connection normal but no working
	Green flashing (1 Hz)	Utility charging or is in the bypass mode
	Yellow flashing (1 Hz)	Working in the generator mode
	Red ON	Utility charging fault
RUN	Green flashing (1 Hz)	Normal communication
	Red flashing (1 Hz)	Communication fault

2.2 Button

Button	Operation	Instruction
	Click	• Exit the current interface • Switch from the "home screen" to the "Main Table Data Information" screen.
	Click	• Browse interface: Up/Down • Parameters setting interface: Increase or decrease the parameter value per step size.
	Press and hold (⩾3s)	Parameters setting interface: Increase or decrease the parameter value per 10 times the step size.
	Click	• Click on the home screen to enter the parameter browse interface. • Click on the parameter browse interface to enter the parameter setting interface. • Confirm the setting parameters
	Press and hold (⩾3s)	Press and hold on the home screen to enter the password interface. After verifying the password, enter the parameter browse interface.
	Click	Click on the time or password setting interface to move the cursor left.
	Press and hold (⩾3s)	Press and hold on the home screen to turn on/off the inverter output, the utility charging, or the utility bypass.

2.3 Home screen

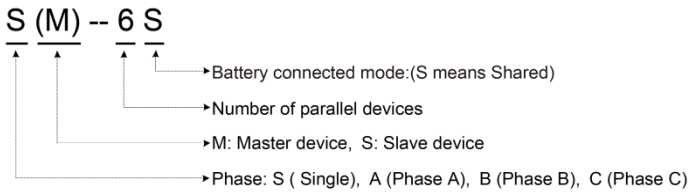


No.	Instruction
❶	Displays the system time, current battery type, and charging state. When the BMS communication is normal, the icon BMS will be shown on the far right, while when it is abnormal, the icon BMS will be shown on the same position.
❷	PV icon: indicates that PV connection is normal. indicates that PV is not connected (or is flat at night).
	Actual PV voltage / total PV power
❸	Utility icon: indicates that Utility connection is normal. indicates that Utility is not connected. Utility working Status : Utility feeds to the device The device feeds the grid (Note: The power value is negative number when the device feeding the grid.)
	Utility input voltage / Utility input power
❹	Status: When there are no faults, it displays "OK." When faults occur, it displays the minimum fault code. Note: On the home screen, click the "UP/DOWN" button to select the "Status" bar, and click the "ENTER" button to check the detailed fault.

❺	Load icon:  indicates that AC output is normal.  indicates that there is no AC output.
	AC output voltage / AC output power
❻	Battery status: ◄-------- The battery is discharging. --------► The battery is being charged.
	Battery voltage / battery current / lithium battery real-time SOC (displays "--" without lithium battery).
❼	Parallel status icon. It shows when there is two or more inverter/chargers connect in parallel successfully, and it will not display on the single inverter/charger.

★ In the battery mode, the equalizing charging is performed on the 28th of each month by default (the date can be modified).

- **The meanings of each letter in the parallel status icon are as follows:**



Note: The master and slave units are randomly defined.

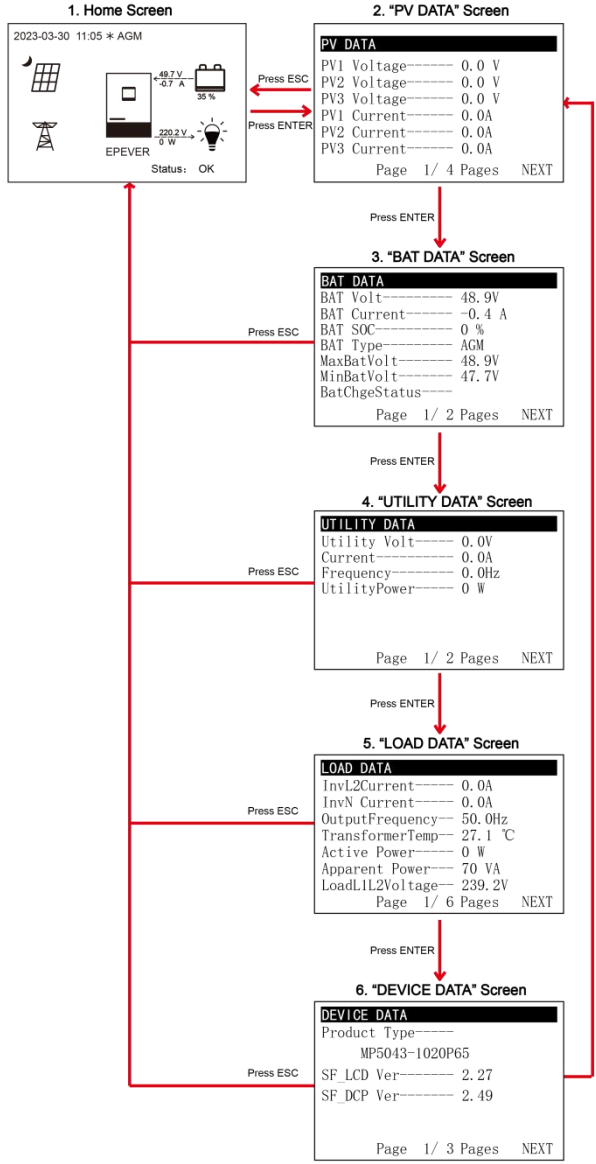
2.4 Interface

2.4.1 Real-time data interface

After powering on the inverter/charger, the home screen shows up. Click the "ENTER" button to enter the real-time data screen.

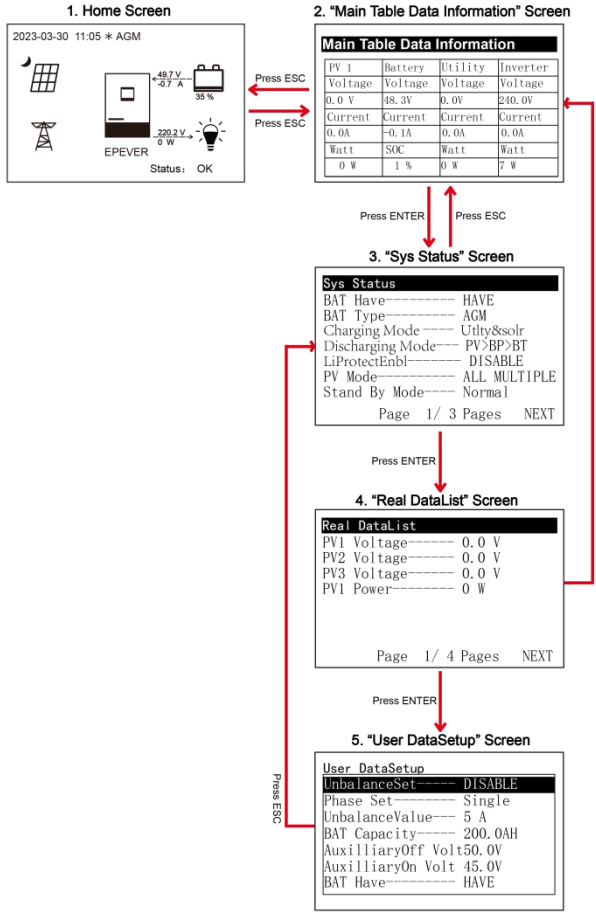
Press the “UP/DOWN” button to view all parameters of the current screen, or click the "ESC" button to return the home screen.

Note: When you stay in other screens other than the home screen, if there is no operation within 20s, it will automatically return to the home screen.


1. Home Screen
2023-03-30 11:05 ☀ AGM
49.7 V
-0.7 A
35 %
220.2 V
0 W
EPEVER
Status: OK
Press ESC
Press ENTER
2. "PV DATA" Screen
PV DATA
PV1 Voltage------ 0.0 V
PV2 Voltage------ 0.0 V
PV3 Voltage------ 0.0 V
PV1 Current------ 0.0A
PV2 Current------ 0.0A
PV3 Current------ 0.0A
Page 1/ 4 Pages NEXT
Press ENTER
3. "BAT DATA" Screen
BAT DATA
BAT Volt--------- 48.9V
BAT Current------ -0.4 A
BAT SOC---------- 0 %
BAT Type--------- AGM
MaxBatVolt------- 48.9V
MinBatVolt------- 47.7V
BatChgeStatus-----
Page 1/ 2 Pages NEXT
Press ESC
Press ENTER
4. "UTILITY DATA" Screen
UTILITY DATA
Utility Volt----- 0.0V
Current---------- 0.0A
Frequency-------- 0.0Hz
UtilityPower----- 0 W
Page 1/ 2 Pages NEXT
Press ESC
Press ENTER
5. "LOAD DATA" Screen
LOAD DATA
InvL2Current----- 0.0A
InvN Current----- 0.0A
OutputFrequency-- 50.0Hz
TransformerTemp-- 27.1 ℃
Active Power----- 0 W
Apparent Power--- 70 VA
LoadL1L2Voltage-- 239.2V
Page 1/ 6 Pages NEXT
Press ESC
Press ENTER
6. "DEVICE DATA" Screen
DEVICE DATA
Product Type-----
MP5043-1020P65
SF_LCD Ver------- 2.27
SF_DCP Ver------- 2.49
Page 1/ 3 Pages NEXT
Press ESC
Press ENTER

2.4.2 User interface

After powering on the inverter/charger, the home screen shows up. Click the "ESC" button to enter the "Main Table Data Information" screen. Click the "ENTER" button to enter the next interface, or click the "UP/DOWN" button to browse the current screen display.



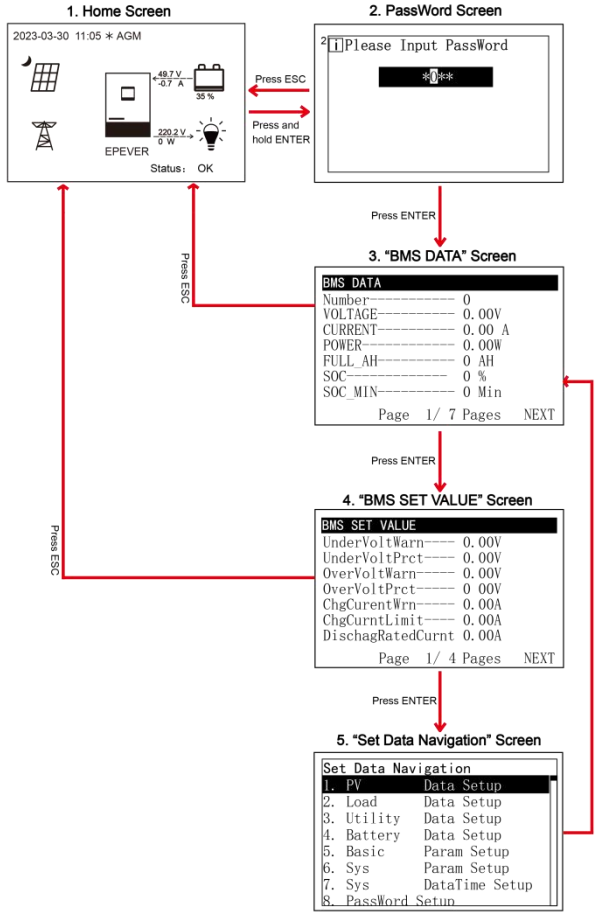
➢ **"User Data Setup" interface**

The end-users can modify common parameters on the "User Data Setup" interface without inputting the

password. The default parameters and setting range refer to chapter 2.5.1 Parameters list.

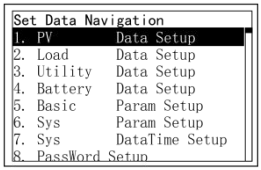
2.4.3 Administrator interface

After powering on the inverter/charger, the home screen shows up. Press and hold the "ENTER" button to enter the password interface. Input the password correctly to check all parameters or modify them.



2.5 Parameters setting

2.5.1 Parameters list



Enter the "Set Data Navigation" interface according to chapter 2.4.3 Administrator interface. Then click the "UP/DOWN" button to select navigation 1 to 9 for detail settings. Default parameters and setting ranges are shown in the following table.

Note: On the parameter setting interface, click the "UP/DOWN" button to increase/decrease the parameter value by one step size (step size is the minimum unit to modify the parameter). Press and hold the "UP/DOWN" button to increase/decrease the parameter value by ten times the step size. Except for the "BAT Capacity (Battery capacity)," press and hold the "UP/DOWN" button to increase/decrease the parameter value by one hundred times of the step size. Press the "ENTER" button to confirm after the parameter settings are completed.

Parameters	Default	User define
1. PV Data Setup		
PV Maximum Power (PV maximum power)	5000W	Read-only
PV OC Voltage (PV open-circuit voltage)	195V	Read-only
2. Load Data Setup		
OutputVoltLevel (Output voltage level)	240V	User define: 220V/230V/240V, step size: 0.1V Note: Takes effect when restarting the inverter/charger.
OutputFrequency (Output Frequency)	50Hz	User define: 50Hz / 60Hz Note: Takes effect when restarting the inverter/charger.
UnbalanceSet (Current unbalance set)	DISABLE	User define: DISABLE, ENABLE Note: Only takes effect when use in three-phase
Phase Set	Single	Single, Phase A, Phase B, Phase C Note: Takes effect when restarting the inverter/charger.
UnbalanceValue (Current unbalance value)	5A	User define: 0A to 6000A, step size: 1A Only takes effect when use in three-phase. When “UnbalanceSet” is enabled, if current unbalance value between any two phases is higher than the set value, the device will be turned off automatically.

Parameters	Default	User define
PAR ChageCurent (Parallel charge current)	100A	User define: 0A to 1200.0A, step size: 0.1A Only takes effect when the inverter/chargers are in parallel. The total charging current will not increase when the parallel charging total current is higher than this value.
PARDisChageCurent (Parallel discharge current)	200A	User define: 0A to 2400.0A, step size: 0.1A Only takes effect when the inverter/chargers are in parallel. The device will automatically shut down and report "Err092" fault when the parallel discharging total current is higher than this value. Restore after 1 minute, then repeat the above operation.
3. Utility Data Setup		
OverVoltDisconnect (Utility over voltage disconnect voltage)	285.0V	User define: (OverVoltReconnect plus 10V) to 295.0V, step size: 0.1V
OverVoltReconnect (Utility over voltage reconnect voltage)	275.0V	User define: 235.0V to (OverVoltDisconnect minus 10V), step size: 0.1V
Low Volt Disconnect (Utility low voltage disconnect voltage)	170.0V	User define: 170.0V to (LowVolt Reconnect minus 10V), step size: 0.1V
LowVolt Reconnect (Utility low voltage reconnect voltage)	180.0V	User define: (Low Volt Disconnect plus 10V) to 220.0V, step size: 0.1V
OverFreqDisconnect (Utility over frequency disconnect)	70.0Hz	User define:(UnderFreqDisconnect plus 2.5Hz) to 70.0Hz or 50.0Hz to 70.0Hz, step size: 0.1Hz Note: Take the maximum value between (UnderFreqDisconnect plus 2.5Hz) and 50.0Hz
UnderFreqDisconnect(Utility under frequency disconnect)	40.0Hz	User define: 40.0Hz to 60.0Hz or 40Hz to (OverFreqDisconnect minus 2.5Hz), step size: 0.1Hz Note: Take the minimum value between (OverFreqDisconnect minus 2.5Hz) and 60.0Hz.
MaxCharge Current (Max. Utility charging current)	50.0A	User define: 0A to 50.0A, step size: 0.1A The current at the battery terminal during Utility charging for MP3043-1020P65.
	80.0A	User define: 0A to 80.0A, step size: 0.1A. The current at the battery terminal during Utility charging for MP5043-1020P65.

Parameters	Default	User define
MaxUtiltyInCurent (Max. Utility input current)	18.0A	User define: 0A to 18.0A for MP3043-1020P65, step size: 0.1A Note: When the Utility is in charging and bypass state, and the actual Utility input current is greater than the set "MaxUtiltyInCurent," the charging current will be decreased until 0A after the Utility input current reaches the set value.
	31.0A	User define: 0A to 31.0A for MP5043-1020P65, step size: 0.1A Note: When the Utility is in charging and bypass state, and the actual Utility input current is greater than the set "MaxUtiltyInCurent", the charging current will be decreased until 0A after the Utility input current reaches the set value.
Gird Feed Current	12.5A	User define: 0A to 12.5A for MP3043-1020P65, step size: 0.1A
	18.0A	User define: 0A to 18.0A for MP5043-1020P65, step size: 0.1A
Gird Feed Enable	DISENBLE	User define: DISABLE, ENABLE Note: See “Chapter 2.5.5” for the introduction of Gird Feed Current
Note:The and frequency protection parameters are modified, the machine must be restarted, otherwise the protection will fail. Do not modify the state voltage and frequency protection parameters in the operation of a machine, otherwise the protection will fail.		
4. Battery Data Setup		
BAT Set Mode (Battery set mode)	Smart	User define: Smart (see 2.5.2), Expert (see 2.5.3)
BAT Capacity (Battery capacity)	200.0AH	User define: 0AH to 600.0AH, step size: 0.1AH
EqualizeTime (Battery equalize charging time)	120 Min	User define: 10 minutes to 180 minutes, step size: 1minute
Boost Time (Battery boost charging time)	120 Min	User define: 10 minutes to 180 minutes, step size: 1 minute
T/C mV/℃/2 (Batterytemperature compensate coefficient)	3	User define: 0—9, step size: 1

Parameters	Default	User define
AuxiliaryOff Volt (Auxiliary module Off voltage)	53.0V	User define: (Auxiliary module ON voltage plus 0.2*N) to (Charging limit voltage) (N=Rated battery voltage/12), step size: 1 Note: In PV charging priority mode, stop Utility charging when the battery voltage is greater than this value.
Auxiliary On Volt (Auxiliary module ON voltage)	45.0V	User define: (Low voltage disconnect voltage) to (Auxiliary module Off voltage minus 0.2*N) (N=Rated battery voltage/12), step size: 0.1V Note: In PV charging priority mode, start Utility charging when the battery voltage is less than this value.
MaxCharginCurrent (Battery limit charging current)	100.0A	User define: 0A to 100.0A, step size: 0.1A Namely, the maximum allowable charge current on battery side.
LimitDisChgCurrt (Battery limit discharging current)	200.0A	User define: 10.0A to 1000.0A, step size: 0.1A Namely, the maximum allowable discharge current on battery side.
BMS ComStatus (BMS Communication Status)	164	Read-only, "164 indicates abnormal BMS communication, 165 means normal BMS communication"
ChargeControlMode (Battery charge control mode)	VOLT (Voltage)	User define: VOLT, SOC **VOLT :** The battery voltage control parameters take effect after setting this value as “VOLT.” **SOC :** The SOC parameters take effect after setting this value as “SOC.” **Note: If "SOC" is selected, the battery needs to go through several full charge and discharge cycles, and the battery capacity must be set correctly.**
BMS InvalidAction	DSP Auto	Read-only

Parameters	Default	User define
Full Discnnct Soc	100%	Only "ChargeControlMode" is set as the effect of the “SOC." The battery SOC is higher than or equals to the SOC value, and the inverter/charger will charging automatically. User define: 60% to (Full energy disconnect Soc plus 5%) to 100% or 80% to 100%, step size: 1% Note: Take the maximum value between (Full energy disconnect Soc plus 5%) and 80%.
FulDiscnctRecvSoc (Full energy disconnect recover Soc)	95%	Only "ChargeControlMode" is set as the effect of the “SOC". The battery SOC is lower than to the SOC value, and the inverter/charger will charging automatically. User define: 60% to (Full energy disconnect Soc minus 5%), step size: 1%
LwEngyDisRecvrSoc (Low energy disconnect recover Soc)	25%	Only "ChargeControlMode" is set as the effect of the “SOC". It cannot be set separately (equals the "LwEgyDnctRecvrSoc").
UnderEngyAlarmSoc (Under energy alarm Soc)	20%	Only "ChargeControlMode" is set as the effect of the “SOC". User define: 10% to 35%, or 10% to (Low energy disconnect recover Soc minus 5%), step size: 1% Note: Take the minimum value between (Low energy disconnect recover Soc minus 5%) and 35%.
LwEgyDnctRecvrSoc (Low energy disconnect recover Soc)	25%	Only "ChargeControlMode" is set as the effect of the “SOC". User define: (Under energy alarm Soc plus 5%) to 60%, or 20% to 60%, step size: 1% Note: Take the maximum value between (Under energy alarm Soc plus 5%) and 20%.
LowEngyDiscnctSoc (Low energy disconnect Soc)	10%	Only "ChargeControlMode" is set as the effect of the “SOC". When the battery SOC is lower than this value, the inverter/charger will stop charging the battery. User define: 0 to 10%, step size: 1%

Parameters	Default	User define
UtiltyChargeOnSoc (Utility charging on Soc)	30%	Only "ChargeControlMode" is set as the effect of the “SOC". User define: 20% to 50%, or 20% to (Utility charging off Soc minus 10%), step size: 1% Note: Take the minimum value between 50% and (Utility charging off Soc minus 10%).
UtiltyChargeOfSoc (Utility charging off Soc)	60%	Only "ChargeControlMode" is set as the effect of the “SOC". User define: 40% to 100% step size: 1% Note: This value should higher than “Utility charging off Soc plus 10%”
REV (Reserved)	50%	Read-only
LimitChgTemp (Limit charge temperature)	-10.0℃	When the environment or the battery temperature is lower than this value, the inverter/charger will stop charging. User define: -30.0℃ to 10.0℃, step size: 0.1℃
LimitDisChgTem (Limit discharge temperature)	-10.0℃	When the environment or the battery temperature is lower than this value, the inverter/charger will stop discharging. User define: -30.0℃ to 10.0℃, step size: 0.1℃
BATOverTemp (Battery over temperature protect)	60.0℃	User define: (Battery over temperature protect recover plus 5℃) to 70.0℃, step size: 0.1℃
BATOverTempRecovr (Battery over temperature protect recover)	55.0℃	User define: 25.0℃ to (Battery over temperature protect minus 5℃), step size: 0.1℃
Equalize Date	28	User define: 1－28, step size: 1
Manual Equalize	OFF	User define: OFF, ON This parameter is for manual equalizing charging. When set to "ON," the inverter/charger enters the manual equalizing charging working mode.
ResetSocCalculate (Reset Soc calculate)	--	Press the ENTER button to reset, the SOC will be automatically recalculated.
ResetSelfStudyAH	--	Press the ENTER button to reset the self study AH.
5. Basic Param Setup		

Parameters	Default	User define
BAT Have (Battery have or not)	HAVE	User define: Rev, NO, HAVE Note: After setting, restart the inverter/charger for the setting to take effect. If the Rev is set, the system will be automatically adjusted to the battery mode.
Charging Mode	Utlty&solr	User define: Solar, SolarPrior (Solar priority), Utlty&solr (Utility & solar), UtltyPrior (Utility priority). For detailed working modes, refer to chapter 5.
Discharging Mode	PV>BP>BT	User define: PV>BP>BT (namely, PV>Bypass> Battery), PV>BT>BP (namely, PV>Battery> Bypass), BP>PV>BT (namely, Bypass>PV> Battery) For detailed working modes, refer to chapter 5.
LiProtectEnbl (Lithium battery protection enable)	DISABLE	User define: DISABLE, ENABLE Set this value as "ENABLE," the charge/discharge low temperature limit function is effective.
PV Mode	ALL SINGLE	User define: Rev / ALL SINGLE / ALL MULTIPLE Set to "ALL SINGLE" if the three PV arrays are independent. Set to "ALL MULTIPLE" if there is only one PV array, or two or multiple PV arrays are connected in parallel as one access to the inverter/charger (PV terminals of the inverter/charger should be external parallel connected). After setting, restart the inverter/charger for the setting to take effect. The inverter/charger will report an error if set to "Rev." Please set according to the actual connection.
Stand By Mode	Normal	User define: Normal, Standby When set as "Standby," the inverter/charger will enter standby mode and the AC output will be stopped. And the default value will be restored to "Normal" after inverter/charger restarting.

Parameters	Default	User define
Equalize Enable	DISABLE	User define: DISABLE, ENABLE This parameter is for automatic equalizing charging. Set this value as "ENABLE," the inverter/charger performs the equalize charging automatically. And the default value will be restored to "DISABLE" after inverter/charger restarting.
Charge Flag	FLOAT	Read-only. Note: This value is FLOAT or BOOST, indicating the charging status sent by the LCD.
Calibration Mode	OFF	Read-only
Return Factory Set (Return to the factory settings)	--	Factory Set (After setting the "Stand By Mode" as "Standby," all settings except the history faults can be restored to the factory state.) Note: After setting, restart the inverter/charger for the setting to take effect.
FR (fault reset)	--	Press the “ENTER” button to exit the current fault state and resume normal operation. Note:The historical fault records will not be cleared.
Load Open/Close	OPEN	User define: CLOSE, OPEN. Open or close the loads. (This parameter and the load output switch are of the same control. To change the state of either of them, the other will be changed too.)
Invert Open/Close (Inverter Open/Close)	OPEN	Read-only
PV Charge Open/Close	OPEN	Read-only
AC Charge Open/Close	OPEN	Read-only
Charge Enable	OPEN	Read-only
Discharge Enable	OPEN	Read-only
ClearAccum Energy (Clear accumulated energy)	--	Press the ENTER button to clear all accumulated charge and discharge energy.
DryContactOnVolt (Dry contact ON voltage)	44.0V	User define: 0V to 59.2V, step size: 0.1V Note: 0 to (Dry contact OFF voltage minus 0.2*N) (N=Rated battery voltage/12)
DryContactOfVolt (Dry contact OFF voltage)	50.0V	User define: 45.2V to 60.0V, step size: 0.1V Note: (Dry contact ON voltage plus 0.2*N) to 60.0V (N=Rated battery voltage/12)

Parameters	Default	User define
AC Input Mode	Grid	User define: Grid, Generator When the AC input is a generator, this parameter needs to be set to "Generator" to improve the charging capability. Note: If the AC input mode does not match the AC source of the actual input, the normal operation of the inverter/charger will be affected. After setting, restart the inverter/charger for the setting to take effect.
BATT Input Mode	Shared	Read-only
6. Sys Param Setup		
BackLightTime	30S	6S, 30S, 60S, Always
BuzzerAlert	ON	User define: OFF, ON If set to "ON," the buzzer will sound when an error occurs and will keep silence when the error is cleared. If set to "OFF," the buzzer will not sound even if an error occurs.
BckLightOnOff (Back Light On/Off)	ON	User define: OFF, ON Note: “BckLightOnOff” is superior to “BackLightTime.”
BaudRate	115200	User define: 115200, 9600, 19200, 38400, 57600
Address	1	User define: 1—254, step size: 1
Log Data Interval	60Sec	User define: 1 second to 3600 seconds, step size: 1 second. Note: When setting this value, press and hold the "UP/DOWN" button to increase/decrease the value by 10x step size, namely, 10 seconds. Set the time interval of the historical data (only refers to the voltage, current and other data stored regularly, excluding the historical faults. These historical data can be exported by the Solar Guardian PC software or Website.)
Language	ENGLISH	User define: ENGLISH, CHINESE
BlueValid	INVALID	Read-only
Temperature Unit	℃	User define: ℃, ℉
BMS Valid/Invalid	INVALID	User define: INVALID, VALID Set this value as "VALID," the inverter/charger will communicate with the battery normally.

Parameters	Default	User define
BMS Protocol	0	User define: 0－254, step size: 1 Note: Refer to the Lithium battery protocol file.
BMS Com Method	RS485	Read-only
Led Switch	OPEN	User define: OPEN, CLOSE Turn on/off the PV/LOAD/GRID/RUN indicators.
BMSVltCntrlEnable (BMS voltage control enable)	DISABLE	User define: DISABLE, ENABLE Set this value as "ENABLE," the BMS internal control parameters will be automatically synchronized to the inverter/charger, and the inverter/charger will control the battery charging/discharging based on these parameters.
BMSCurent Select (BMS current control select) (See chapter 2.5.4 Battery work modes for details)	DISABLE	User define: INVALID, BMS, VIRTUAL_BMS Set this value as "INVALID," the inverter/charger controls the charge and discharge according to the value set on the LCD. Set this value as "BMS," the inverter/charger controls the charge and discharge according to the read BMS value. Set this value as "VIRTUAL_BMS," the inverter/charger controls the charge and discharge according to the charge-discharge current value calculated by the MAP table, which is preset in the inverter/charger.
Log Data Reset	--	Press the ENTER button to clear the voltage, current and other data stored regularly, excluding the historical faults. **Note: After pressing the ENTER button, the flashing LED light will become steady or turn off, and then the inverter/charger will restart, indicating that the reset is complete.**
BATT Dischage Kx (Batery charge and discharge coefficient)	3C	User define: 1C, 3C This value can be obtained by viewing the battery label. It takes effect only when the “BMSCurent Select” is set as “VIRTUAL_BMS.” When this parameter is set to "3C," the inverter/charger controls the charge and discharge according to the minimum value between 3x BAT Capacity and MaxCharginCurrent/ LimitDisChgCurrt (which are set on the LCD).

Parameters	Default	User define
MAP TEMP Select (MAP temperature select)	Default	User define: Default (25 ℃), BMS_ET (BMS environment temperature), BMS_C_MaxT (BMS cell maximum temperature), BMS_C_MinT (BMS cell minimum temperature), RS485, DSP The MAP table calculates the charging and discharging current values based on the temperature and SOC value of the lithium battery. When the lithium battery has BMS function and supports temperature upload, set “MAP TEMP Select” as "BMS_ET, BMS_C_MaxT, or BMS_C_MinT" according to the uploaded temperature. The “BMS_ET, BMS_C_MaxT, and BMS_C_MinT” take effect only when the “BMSCurent Select” is set as “VIRTUAL_BMS.” When the lithium battery only has a protection board, set “MAP TEMP Select” as “RS485” (A smart remote temperature sensor is needed). Otherwise; select "default (25℃)." “DSP” means the inverter/charger’s temperature by default.
7. Sys DataTime Setup (See chapter 2.5.6)		
8. Password Setup (See chapter 2.5.7)		
9. Bat Control Data Setup (This will take effect when setting the "BAT Set Mode" as "Smart.")		
BAT Set Mode (Battery set mode)	Smart	Read-only
System voltage level	48V	Read-only
Battery Type	AGM	**48V battery type**: AGM, GEL, FLD, LFP15S, LFP16S, LNCM13S, LNCM14S
BoostChargingVolt (Boost charging voltage)	57.6V	Read-only Note: They are determined by the battery type and cannot be modified.
FloatChagingVolt (Float charging voltage)	55.2V	
LowVoltReconect (Low voltage reconnect voltage)	50.4V	
LowVoltDisconect (Low voltage disconnect voltage)	44.4V	

Parameters	Default	User define
9. Bat Control Data Setup (Set the "BAT Set Mode" as "Expert" first)		
BAT Set Mode (Battery set mode)	Expert	Read-only
System voltage level	48V	Read-only
Battery type	AGM	**48V battery type**: AGM, GEL, FLD, LFP15S, LFP16S, LNCM13S, LNCM14S
OverVoltDiscnect (Over voltage disconnect voltage)	64.0V	User define: (Charging limit voltage plus 0.1V) to 16*N, step size: 0.1V Note: N=Rated battery voltage/12.
Charging Limit Volt (Charging limit voltage)	60.0V	User define: (Equalize charging voltage plus 0.1V) to (Over voltage disconnect voltage minus 0.1V), step size: 0.1V
OverVoltReconect (Over voltage reconnect voltage)	60.0V	User define: 9*N to (Over voltage disconnect voltage minus 0.1*N minus 0.1V), step size: 0.1V Note: N=Rated battery voltage/12.
EqualizeChagVolt (Equalize charging voltage)	58.4V	User define: (Boost charging voltage) to (Charging limit voltage), step size: 0.1V
BoostCharginVolt (Boost charging voltage)	57.6V	User define: (Float charging voltage) to (Equalize charging voltage), step size: 0.1V
FloatChagingVolt (Float charging voltage)	55.2V	User define: (Boost voltage reconnect voltage plus 0.1V) to (Boost charging voltage), step size: 0.1V
BoostRecnectVolt (Boost voltage reconnect voltage)	52.8V	User define: (Low voltage reconnect voltage plus 0.1V) to (Float charging voltage minus 0.1V), step size: 0.1V
LowVoltReconect (Low voltage reconnect voltage)	50.4V	User define: (Low voltage disconnect voltage plus 0.1V) to (Boost voltage reconnect voltage minus 0.1V), step size: 0.1V
UndrVltWarnRecvr (Under voltage warning recover voltage)	48.8V	User define: (Under voltage warning voltage plus 0.1*N plus 0.1V) to (Low voltage reconnect voltage), step size: 0.1V. Note: N=Rated battery voltage/12.
UnderVolt Warn (Under voltage warning voltage)	48.0V	User define: (Discharging limit voltage) to (Under voltage warning recover voltage minus 0.1* N minus 0.1V), step size: 0.1V. Note: N=Rated battery voltage/12.

Parameters	Default	User define
LowVoltDisconect (Low voltage disconnect voltage)	44.4V	User define: (Discharging limit voltage) to (Low voltage reconnect voltage minus 0.1V), step size: 0.1V
DischrgeLimitVolt (Discharging limit voltage)	42.4V	User define: "N*9 ≤ Discharging limit voltage < Under voltage warning voltage" and "Discharging limit voltage < Low voltage disconnect voltage", step size: 0.1V Note: N=Rated battery voltage/12.

2.5.2 Battery voltage control parameters (Smart)

After setting the "BAT Set Mode" as "Smart," the battery voltage control parameters are determined by the battery type and cannot be modified. To modify them, set the "BAT Set Mode" as "Expert" first.

2.5.3 Battery voltage control parameters (Expert)

After setting the "BAT Set Mode" as "Expert," all battery voltage control parameters can be modified.

1) Lead-acid battery voltage control parameters

The parameters are measured in the condition of 48V/25 ºC.

Battery Type / Voltage control parameters	AGM	GEL	FLD	User define
Over Voltage Disconnect Voltage	64.0V	64.0V	64.0V	36.0－64.0V
Charging limit voltage	60.0V	60.0V	60.0V	36.0－64.0V
Over Voltage Reconnect Voltage	60.0V	60.0V	60.0V	36.0－64.0V
Equalize Charging Voltage	58.4V	56.8V	59.2V	36.0－64.0V
Boost Charging Voltage	57.6V	56.8V	58.4V	36.0－64.0V
Float Charging Voltage	55.2V	55.0V	55.2V	36.0－64.0V
Boost Voltage Reconnect Voltage	52.8V	52.8V	52.8V	36.0－64.0V
Low Voltage Reconnect Voltage	50.4V	50.4V	50.4V	36.0－64.0V
Under Voltage Warning Recover Voltage	48.8V	48.8V	48.8V	36.0－64.0V
Under Voltage Warning Voltage	48.0V	48.0V	48.0V	36.0－64.0V
Low Voltage Disconnect Voltage	44.4V	44.4V	44.4V	36.0－64.0V
Discharging Limit Voltage	42.4V	42.4V	42.4V	36.0－64.0V

The following rules must be obeyed when setting the Lead-acid battery voltage control parameters.

A. Over Voltage Disconnect Voltage > Charging Limit Voltage ≥ Equalize Charging Voltage ≥ Boost Charging Voltage ≥ Float Charging Voltage > Boost Voltage Reconnect Voltage

B. Over Voltage Disconnect Voltage > Over Voltage Reconnect Voltage

C. Low Voltage Reconnect Voltage > Low Voltage Disconnect Voltage ≥ Discharging Limit Voltage

D. Under Voltage Warning Recover Voltage > Under Voltage Warning Voltage ≥ Discharging Limit Voltage

E. Boost Voltage Reconnect Voltage > Low Voltage Reconnect Voltage

2) Lithium battery voltage control parameters

Battery Type / Voltage control parameters	LFP		
	LFP15S	LFP16S	User Define
Over Voltage Disconnect Voltage	55.5V	59.2V	36.0－64.0V
Charging Limit Voltage	54.7V	58.4V	36.0－64.0V
Over Voltage Reconnect Voltage	54.7V	58.4V	36.0－64.0V
Equalize Charging Voltage	53.5V	57.1V	36.0－64.0V
Boost Charging Voltage	53.5V	57.1V	36.0－64.0V
Float Charging Voltage	51.0V	54.4V	36.0－64.0V
Boost Voltage Reconnect Voltage	49.9V	53.3V	36.0－64.0V
Low Voltage Reconnect Voltage	48.7V	52.0V	36.0－64.0V
Under Voltage Warning Recover Voltage	48.0V	51.2V	36.0－64.0V
Under Voltage Warning Voltage	46.5V	49.6V	36.0－64.0V
Low Voltage Disconnect Voltage	43.5V	46.4V	36.0－64.0V
Discharging Limit Voltage	41.2V	44.0V	36.0－64.0V

Note: The LFP15S and LFP16S are the voltage grades.

Battery Type / Voltage control parameters	LNCM		
	LNCM13S	LNCM14S	User Define
Over Voltage Disconnect Voltage	55.9V	60.2V	36.0－64.0V
Charging Limit Voltage	55.2V	59.5V	36.0－64.0V
Over Voltage Reconnect Voltage	55.2V	59.5V	36.0－64.0V
Equalize Charging Voltage	53.8V	57.9V	36.0－64.0V
Boost Charging Voltage	53.8V	57.9V	36.0－64.0V
Float Charging Voltage	52.0V	56.0V	36.0－64.0V
Boost Voltage Reconnect Voltage	51.1V	55.2V	36.0－64.0V
Low Voltage Reconnect Voltage	48.1V	51.8V	36.0－64.0V
Under Voltage Warning Recover Voltage	46.8V	50.4V	36.0－64.0V
Under Voltage Warning Voltage	45.5V	49.0V	36.0－64.0V
Low Voltage Disconnect Voltage	41.6V	44.8V	36.0－64.0V
Discharging Limit Voltage	40.3V	43.4V	36.0－64.0V

Note: The LNCM13S and LNCM14S are the voltage grades.

When setting the Lithium battery voltage control parameters, the following rules must be obeyed.

A. Over Voltage Disconnect Voltage < Over Charging Protection Voltage (BMS Circuit Protection Modules) minus 0.2V

B. Over Voltage Disconnect Voltage > Charging Limit Voltage ≥ Equalize Charging Voltage ≥ Boost Charging Voltage ≥ Float Charging Voltage > Boost Voltage Reconnect Voltage

C. Over Voltage Disconnect Voltage > Over Voltage Reconnect Voltage

D. Boost Voltage Reconnect Voltage > Low Voltage Reconnect Voltage > Low Voltage Disconnect Voltage ≥ Discharging Limit Voltage

E. Under Voltage Warning Recover Voltage > Under Voltage Warning Voltage ≥ Discharging Limit Voltage

F. Low Voltage Disconnect Voltage ≥ Over Discharging Protection Voltage (BMS Circuit Protection Modules) plus 0.2V

CAUTION	The BMS circuit protection module's voltage control accuracy must be at least ±0.2V. The [Over Voltage Disconnect Voltage] shall be lower than the protection voltage of the BMS circuit protection module. In contrast, the [Low Voltage Disconnect Voltage] shall be higher. The increased voltage of the [Over Voltage Disconnect Voltage] and the [Low Voltage Disconnect Voltage] is determined by the control accuracy of the BMS circuit protection module.

2.5.4 Battery work modes

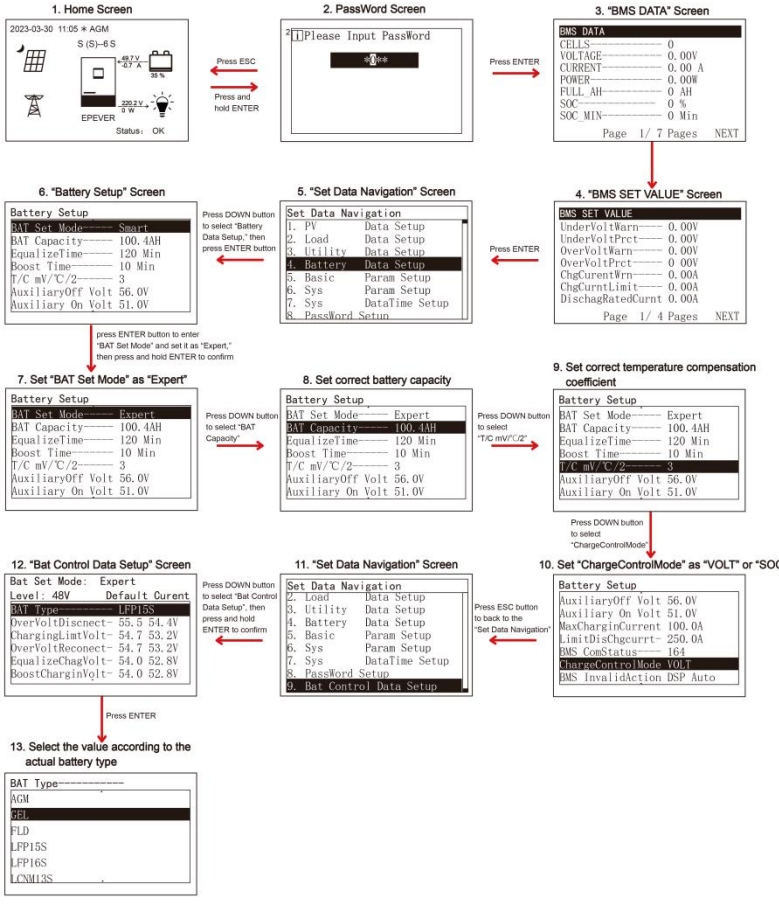
The following table lists the recommended working mode and setting process for different application scenarios. According to your current battery status (such as whether it is a lithium-ion battery pack, whether it has BMS function, whether it has current control function at the end of charge and discharge, etc.), you can reasonably set the parameters to ensure that the battery works in the optimal performance, so as to ensure the safe operation of the system for a long time.

No.	Scenario	Recommended work Mode	Setting Process
1	Non-lithium battery pack	The inverter/charger controls charging and discharging based on the LCD settings.	See Figure 1 “Setting process for non-lithium battery pack ”
2	1. Lithium battery pack with BMS and current control function at the end of charge and discharge 2. Normal communication	The inverter/charger controls charging and discharging based on the read BMS values.	See Figure 2 “Setting process for lithium battery pack with BMS and current control function”
3	1. Lithium battery pack with BMS, without current control function at the end of charge and discharge	The inverter/charger controls charging and discharging based on the pre-set MAP table.	See Figure 3 “Setting process for lithium battery pack with BMS, without current control function”

	2. Normal communication		
4	1. Lithium battery pack with protective board only (no BMS) 2. No communication (A smart remote temperature sensor is recommended in this scenario.)	The inverter/charger controls charging and discharging based on the pre-set MAP table.	See Figure 4 “Setting process for lithium battery pack with protective board only”

- **Figure 1 “Setting process for non-lithium battery pack”**

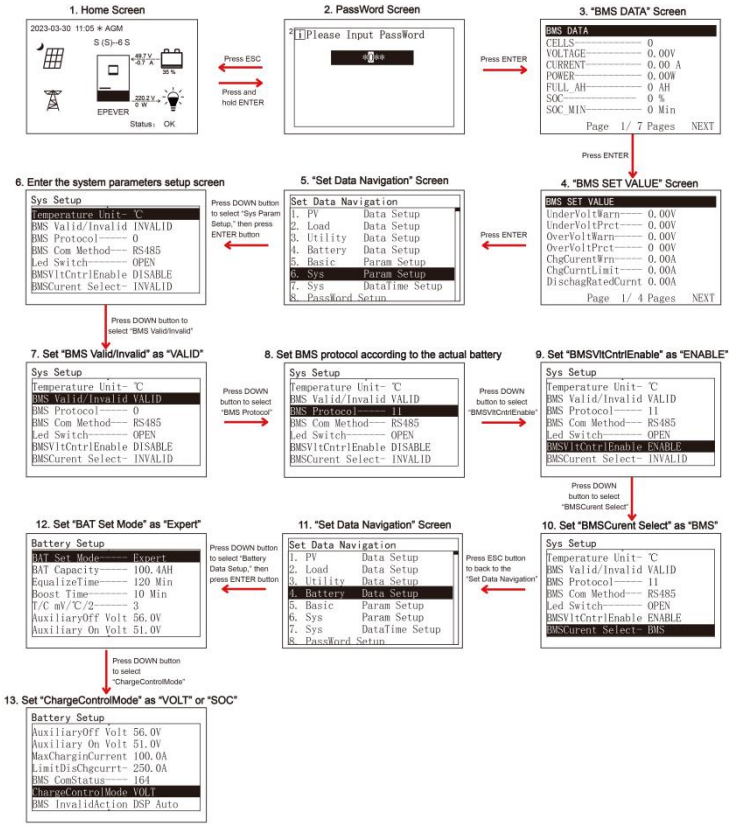
When the system adopts non-lithium battery packs (such as AGM, GEL, or FLD batteries), follow the flowchart below to set parameters correctly. Set “BAT Capacity, T/C mV/℃/2, Battery Type” correctly, and set “ChargeControlMode” as “VOLT” or “SOC.” And then set the battery voltage control parameters or SOC control parameters. The inverter/charger will control charging and discharging based on the LCD settings.



- **Figure 2 "Setting process for lithium battery pack with BMS and current control function"**

When the system adopts a lithium battery pack with BMS and current control function at the end of charge and discharge, and the lithium battery pack can communicate with the inverter/charger normally, follow the flowchart below to set parameters correctly. Set BMS protocol correctly, set "BMS Valid/Invalid" as "VALID," set "BMSVltCntrlEnable" as "ENABLE," set "BMSCurent Select" as "BMS," and set "ChargeControlMode" as "VOLT" or "SOC." And then set the battery voltage control parameters or SOC

control parameters. The inverter/charger controls charging and discharging based on the read BMS values.

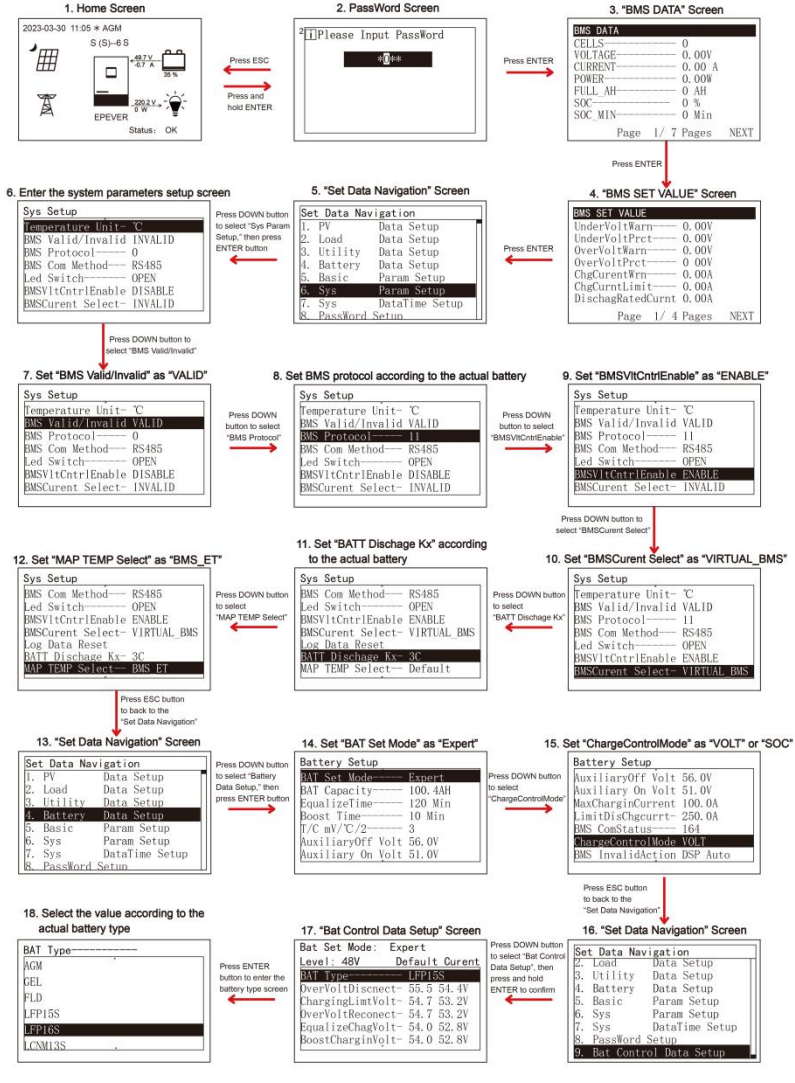


Tip	Please go to EPEVER official website to download the currently supported BMS manufacturers and the BMS parameters.
CAUTION	● The inverter/charger will control charging and discharging based on the LCD settings after setting the “BMSCurent Select” as “INVALID,” or the communication between battery and inverter/charger fails. ● The inverter/charger controls charging and discharging based on the pre-set MAP table after setting the “BMSCurent Select” as “VIRTUAL_BMS.”

	● Due to the different charging and discharging characteristics and voltage consistency of lithium batteries from different manufacturers, it is necessary for professionals to guide the use of VIRTUAL_BMS for charging and discharging.

- **Figure 3 "Setting process for lithium battery pack with BMS, without current control function"**

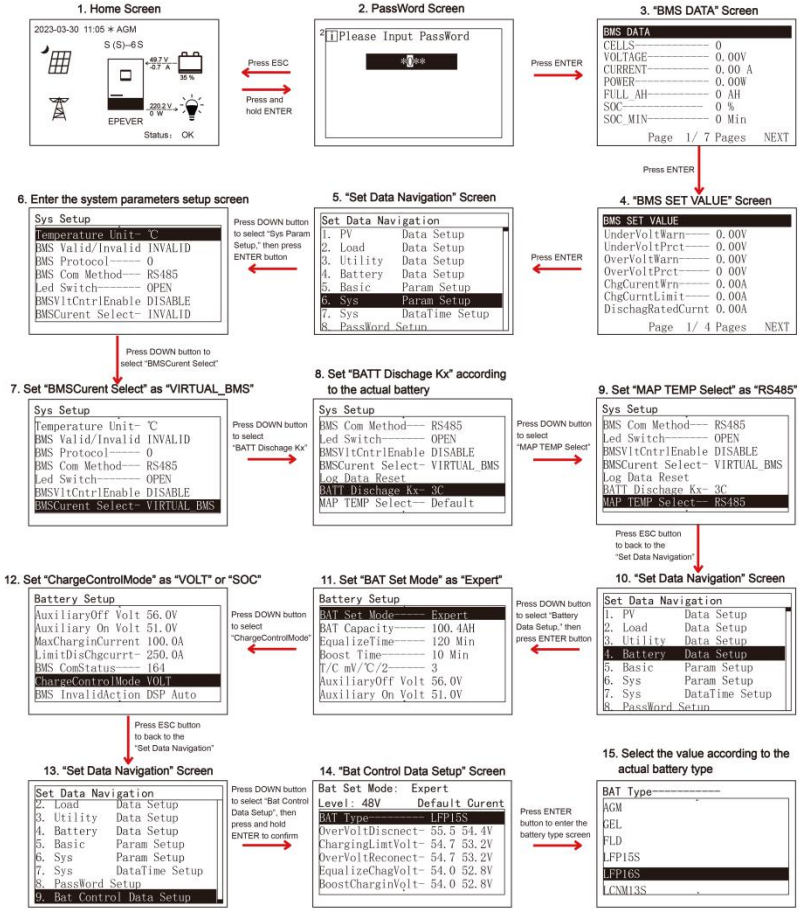
When the system adopts a lithium battery pack with BMS, while without current control function at the end of charge and discharge, and the lithium battery pack can communicate with the inverter/charger normally, follow the flowchart below to set parameters correctly. Set BMS protocol and "BATT Dischage Kx" (viewing the battery label) correctly, set "BMS Valid/Invalid" as "VALID," set "BMSVltCntrlEnable" as "ENABLE," set "BMSCurent Select" as "VIRTUAL_BMS," set "MAP TEMP Select" as "BMS_ET," set "Battery Type" correctly, and set "ChargeControlMode" as "VOLT" or "SOC." And then set the battery voltage control parameters or SOC control parameters. The inverter/charger controls charging and discharging based on the pre-set MAP table.


1. Home Screen
2023-03-30 11:05 ☀ AGM
S (S)–6 S
49.7 V
-6.7 A
35 %
220.2 V
0 W
EPEVER
Status: OK
Press ESC
Press and hold ENTER
2. PassWord Screen
Please Input PassWord
Press ENTER
3. "BMS DATA" Screen
BMS DATA
CELLS---------- 0
VOLTAGE---------- 0.00V
CURRENT---------- 0.00 A
POWER---------- 0.00W
FULL_AH---------- 0 AH
SOC---------- 0 %
SOC_MIN---------- 0 Min
Page 1/ 7 Pages NEXT
Press ENTER
4. "BMS SET VALUE" Screen
BMS SET VALUE
UnderVoltWarn---- 0.00V
UnderVoltPrct---- 0.00V
OverVoltWarn---- 0.00V
OverVoltPrct---- 0.00V
ChgCurentWrn---- 0.00A
ChgCurntLimit---- 0.00A
DischagRatedCurnt 0.00A
Page 1/ 4 Pages NEXT
Press ENTER
5. "Set Data Navigation" Screen
Set Data Navigation
1. PV Data Setup
2. Load Data Setup
3. Utility Data Setup
4. Battery Data Setup
5. Basic Param Setup
6. Sys Param Setup
7. Sys DataTime Setup
8. PassWord Setup
Press DOWN button to select "Sys Param Setup," then press ENTER button
6. Enter the system parameters setup screen
Sys Setup
Temperature Unit- ℃
BMS Valid/Invalid INVALID
BMS Protocol------ 0
BMS Com Method--- RS485
Led Switch-------- OPEN
BMSVltCntrlEnable DISABLE
BMSCurent Select- INVALID
Press DOWN button to select "BMS Valid/Invalid"
7. Set "BMS Valid/Invalid" as "VALID"
Sys Setup
Temperature Unit- ℃
BMS Valid/Invalid VALID
BMS Protocol------ 0
BMS Com Method--- RS485
Led Switch-------- OPEN
BMSVltCntrlEnable DISABLE
BMSCurent Select- INVALID
Press DOWN button to select "BMS Protocol"
8. Set BMS protocol according to the actual battery
Sys Setup
Temperature Unit- ℃
BMS Valid/Invalid VALID
BMS Protocol------ 11
BMS Com Method--- RS485
Led Switch-------- OPEN
BMSVltCntrlEnable DISABLE
BMSCurent Select- INVALID
Press DOWN button to select "BMSVltCntrlEnable"
9. Set "BMSVltCntrlEnable" as "ENABLE"
Sys Setup
Temperature Unit- ℃
BMS Valid/Invalid VALID
BMS Protocol------ 11
BMS Com Method--- RS485
Led Switch-------- OPEN
BMSVltCntrlEnable ENABLE
BMSCurent Select- INVALID
Press DOWN button to select "BMSCurent Select"
10. Set "BMSCurent Select" as "VIRTUAL_BMS"
Sys Setup
Temperature Unit- ℃
BMS Valid/Invalid VALID
BMS Protocol------ 11
BMS Com Method--- RS485
Led Switch-------- OPEN
BMSVltCntrlEnable ENABLE
BMSCurent Select- VIRTUAL_BMS
Press DOWN button to select "BATT Dischage Kx"
11. Set "BATT Dischage Kx" according to the actual battery
Sys Setup
BMS Com Method--- RS485
Led Switch-------- OPEN
BMSVltCntrlEnable ENABLE
BMSCurent Select- VIRTUAL_BMS
Log Data Reset
BATT Dischage Kx- 3C
MAP TEMP Select-- Default
Press DOWN button to select "MAP TEMP Select"
12. Set "MAP TEMP Select" as "BMS_ET"
Sys Setup
BMS Com Method--- RS485
Led Switch-------- OPEN
BMSVltCntrlEnable ENABLE
BMSCurent Select- VIRTUAL_BMS
Log Data Reset
BATT Dischage Kx- 3C
MAP TEMP Select-- BMS_ET
Press ESC button to back to the "Set Data Navigation"
13. "Set Data Navigation" Screen
Set Data Navigation
1. PV Data Setup
2. Load Data Setup
3. Utility Data Setup
4. Battery Data Setup
5. Basic Param Setup
6. Sys Param Setup
7. Sys DataTime Setup
8. PassWord Setup
Press DOWN button to select "Battery Data Setup," then press ENTER button
14. Set "BAT Set Mode" as "Expert"
Battery Setup
BAT Set Mode------ Expert
BAT Capacity------ 100.4AH
EqualizeTime------ 120 Min
Boost Time-------- 10 Min
T/C mV/℃/2------- 3
AuxiliaryOff Volt 56.0V
Auxiliary On Volt 51.0V
Press DOWN button to select "ChargeControlMode"
15. Set "ChargeControlMode" as "VOLT" or "SOC"
Battery Setup
AuxiliaryOff Volt 56.0V
Auxiliary On Volt 51.0V
MaxChargInCurrent 100.0A
LimitDisChgcurrt- 250.0A
BMS ComStatus---- 164
ChargeControlMode VOLT
BMS InvalidAction DSP Auto
Press ESC button to back to the "Set Data Navigation"
16. "Set Data Navigation" Screen
Set Data Navigation
2. Load Data Setup
3. Utility Data Setup
4. Battery Data Setup
5. Basic Param Setup
6. Sys Param Setup
7. Sys DataTime Setup
8. PassWord Setup
9. Bat Control Data Setup
Press DOWN button to select "Bat Control Data Setup", then press and hold ENTER to confirm
17. "Bat Control Data Setup" Screen
Bat Set Mode: Expert
Level: 48V Default Curent
BAT Type---------- LFP15S
OverVoltDiscnect- 55.5 54.4V
ChargingLimtVolt- 54.7 53.2V
OverVoltReconect- 54.7 53.2V
EqualizeChagVolt- 54.0 52.8V
BoostChargInVolt- 54.0 52.8V
Press ENTER button to enter the battery type screen
18. Select the value according to the actual battery type
BAT Type----------
AGM
GEL
FLD
LFP15S
LFP16S
LCNM13S

CAUTION	● The inverter/charger will control charging and discharging based on the LCD settings after setting the “BMS Current Select” as “INVALID.” ● Due to the different charging and discharging characteristics and voltage consistency of lithium batteries from different manufacturers, it is necessary for professionals to guide the use of VIRTUAL_BMS for charging and discharging. ● The MAP table controlling the battery charge and discharge is only related to parameters of “BMS Current Select, BATT Discharge Kx, Battery Type, and MAP TEMP Select.”

- **Figure 4 “Setting process for lithium battery pack with protective board only”**

When the system adopts a lithium battery pack with protective board only, and the lithium battery pack cannot communicate with the inverter/charger normally (A smart remote temperature sensor is recommended in this scenario. Reserved function, this product is under development.), follow the flowchart below to set parameters correctly. Set “BATT Discharge Kx” (viewing the battery label) correctly, set “BMS Current Select” as “VIRTUAL_BMS,” set “MAP TEMP Select” as “RS485” (A smart remote temperature sensor is needed. Otherwise; select "default (25℃)."), set “Battery Type” correctly, and set “ChargeControlMode” as “VOLT” or “SOC.” And then set the battery voltage control parameters or SOC control parameters. The inverter/charger controls charging and discharging based on the pre-set MAP table.



CAUTION

- The inverter/charger will control charging and discharging based on the LCD settings after setting the "BMSCurent Select" as "INVALID."
- Due to the different charging and discharging characteristics and voltage consistency of lithium batteries from different manufacturers, it is necessary for professionals to guide the use of VIRTUAL_BMS for charging and discharging.
- The MAP table controlling the battery charge and discharge is only related to parameters of "BMSCurent Select, BATT Dischage Kx, Battery Type, and MAP TEMP Select."

2.5.5 Gird feed function

Connect the inverter/charger to the Utility and PV, the gird feed function will be enabled (as shown in table 1) after the battery voltage reaches the target voltage and there still exist excess PV energy.

The inverter/charger will feed the excess PV energy to the grid as per the “Gird feed current,” which will maximize the PV energy utilization.

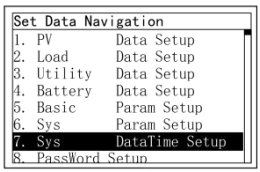
Table 1：Enable the Grid feed function

No.	PARE	Value	Explanation
1	Gird Feed Enable	ENABLE	Enable the grid feed function
2	Gird Feed Current	Choose in a set range	The maximum control current for the grid feed process.

Table 2：Gird feed working mode

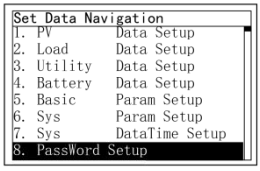
No.	Charging Mode	Discharging Mode	Explanation
1	UtltyPrior (Utility priority)	No influence. arbitrary Settings	The inverter/charger can not feed excess PV energy to the grid.
2	Utlty&solr (Utility & solar)	No influence. arbitrary Settings	After meeting the requirement, the inverter/charger feed excess PV energy to the grid.
3	Solar	BP>PV>BT	
4	SolarPrior (Solar priority)		

2.5.6 Time setting



Enter the "Set Data Navigation" interface according to chapter 2.4.3 Administrator interface. Then click the "UP/DOWN" button to select "7 Sys Data Time Setup", and click the "ENTER" button to enter the system time setting interface. On the system time setting interface, click the "ENTER" button to move right, click the "AC OUT" button to move left, and click the "UP/DOWN" button to adjust the value. After the time setting is completed, move the cursor back to the first digit and click the "ENTER" to confirm. The system time is updated if the setting value complies with the range.

2.5.7 Password modifying



Enter the "Set Data Navigation" interface according to chapter 2.4.3 Administrator interface. Then click the "UP/DOWN" button to select "8 PassWord Setup", and click the "ENTER" button to enter the password modifying interface. Click the "ENTER" button to move right, click the "AC OUT" button to move left, and click the "UP/DOWN" button to adjust the value. After the password is modified, move the cursor back to the first digit and click the "ENTER" button to confirm.

Note: The default password is "0000", which is set to prevent non-professional operations. Please memorize the new password after modifying it. If forgetting the password, press and hold the "AC OUT" button on the password inputting page; the password will be automatically reset to "0000."

3 Single Installation

3.1 Attention

- Please read the manual carefully to familiarize yourself with the installation steps.
- Be very careful when installing the batteries, especially flooded lead-acid batteries. Please wear eye protection, and have fresh water available to rinse if contact with battery acid.
- Keep the battery away from any metal objects, which may cause a short circuit of the battery.
- Flammable, combustible and harmful gases may come out from the battery during charging. Ensure the ventilation condition is good.
- This inverter/charger is wall-mounted. Consider whether the wall's bearing capacity can meet the requirements.
- Ventilation is highly recommended if mounted in an enclosure. Never install the inverter/charger in a sealed enclosure with flooded batteries! Battery fumes from vented batteries will corrode and destroy the inverter/charger circuits.
- The inverter/charger can work with lead-acid and lithium batteries within its control scope.
- Ensure all switches and breakers are disconnected before wiring. You operate the inverter/charger after checking that all wiring is correct.
- Loose connections and corroded wires may produce high heat that can melt wire insulation, burn surrounding materials, or even cause a fire. Ensure tight connections, use cable clamps to secure cables, and prevent them from swaying in motion.
- Select the system connection cables according to the current density no greater than 5A/mm^2.
- Do not install the inverter/charger in a harsh environment such as flammable and explosive or a large amount of dust.
- After turning off the switch, high voltage still exists inside the inverter/charger. Do not open or touch the internal devices; wait ten minutes before conducting related operations.
- Although the inverter/charger provides polarity reversal protection at the input end of the battery, the protection is valid only when the PV or utility is not connected. Please strictly follow the operation and do not operate in fault frequently.
- Although the DC input terminal has reverse polarity protection, which only take effect without PV and Utility connection; please do not operate it in error frequently.
- Utility input and AC output are high voltage. Please do not touch the wiring connection.
- When the fan is working, please do not touch it to avoid injury.

3.2 Wire and breaker size

The wiring and installation methods must conform to all national and local electrical code requirements.

- **Recommended PV wire and breaker size**

Since the PV output current varies with the PV module's size, connection method, or sunlight angle, the minimum wire size can be calculated by the PV Isc (Max. short circuit current). Please refer to the Isc value in the PV module's specifications. When the PV modules are connected in series, the total Isc equals any PV module's Isc. When the PV modules are connected in parallel, the total Isc equals the sum of the PV module's Isc. The PV array's Isc must not exceed the maximum PV input current. When three PV arrays are connected independently, the wire and circuit breaker size of each PV array are as follows:

Model	PV wire size	Breaker size
MP3043-1020P65	10mm²/7AWG	2P—50A/250VDC
MP5043-1020P65	10mm²/7AWG	2P—50A/250VDC

When three PV arrays are connected in parallel, the wire and circuit breaker size are as follows:

Model	PV wire size	Breaker size
MP3043-1020P65	25mm²/3AWG	2P—125A/250VDC
MP5043-1020P65	25mm²/3AWG	2P—125A/250VDC

CAUTION	The Max. PV open circuit voltage is not exceed 195V (the minimum environmental temperature)or 180V (25℃ environmental temperature)

- **Recommended Utility wire size**

Model	Utility wire size	Breaker size
MP3043-1020P65	4mm²/11AWG	2P-25A/250VAC
MP5043-1020P65	6mm²/9AWG	2P-40A/250VAC

- **Recommended battery wire and breaker size**

Model	Battery wire size	Breaker size
MP3043-1020P65	20mm²/4AWG	2P—150A/125VDC
MP5043-1020P65	35mm²/2AWG	2P—250A/125VDC

CAUTION	The recommended battery breaker size is selected when the battery terminals are only connected to one additional inverter.

➢ **Recommended AC output wire size**

Model	Load wire size	Breaker size
MP3043-1020P65	4mm²/11AWG	2P-25A/250VAC
MP5043-1020P65	6mm²/9AWG	2P-40A/250VAC

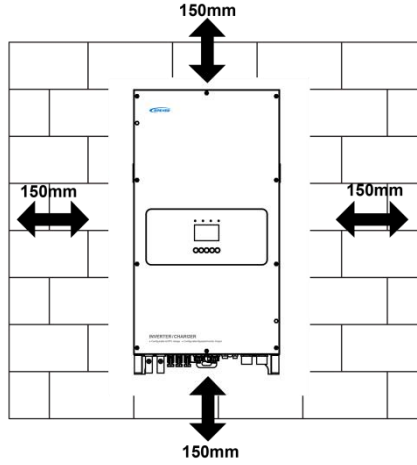
CAUTION	• If the distance between the inverter/charger and the PV array, and distance between the inverter/charger and the battery is long, larger wires shall be used to reduce the voltage drop and improve the system's performance. • The above wire and circuit breaker sizes are for reference only; please choose a suitable wire and circuit breaker according to the actual situation.

3.3 Mounting the inverter/charger

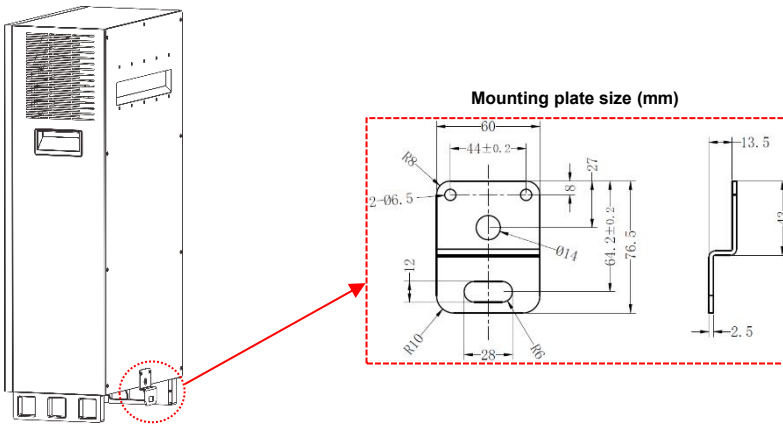
WARNING	Risk of explosion! Never install the inverter/charger in a sealed enclosure with flooded batteries! Do not install the inverter/charger in a confined area where the battery gas can accumulate.
CAUTION	The inverter/charger can be fixed to the concrete and solid brick walls, while it cannot be fixed to the hollow brick wall. The inverter/charger requires at least 150cm of clearance right and left, and 150cm of clearance above and below.

Step1: Determine the installation location and heat-dissipation space.

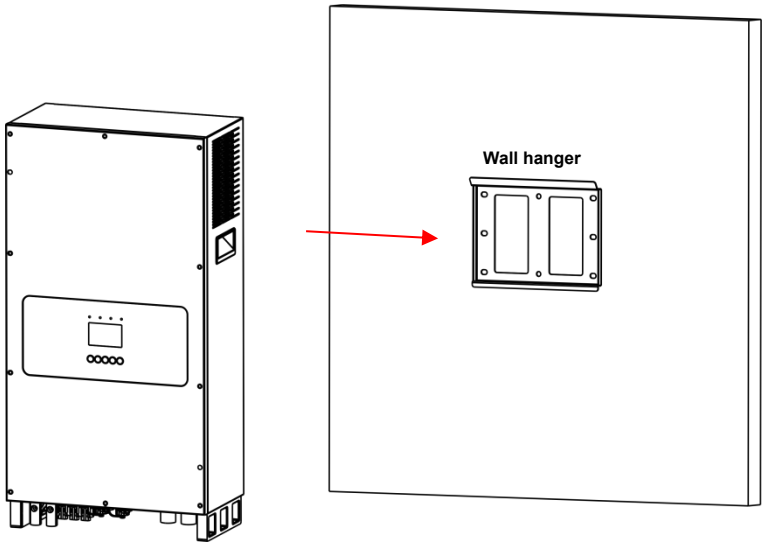
Determine the installation location, such as a solid brick wall. When installing the inverter/charger, ensure enough air is flowing through the sink. Please leave at least 150mm clearance away from the upper and lower edges.



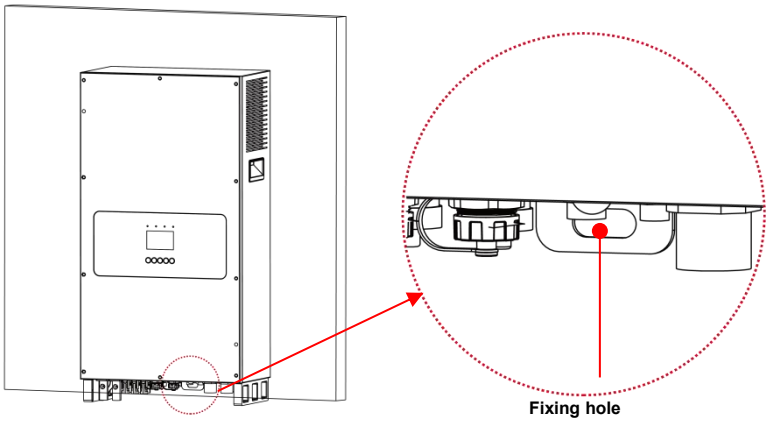
Step 2: Fix the mounting plate (included accessory) to the inverter/charger.



Step 3: Fix the wall hanger (included accessory) to the wall, and put the inverter/charger on it.



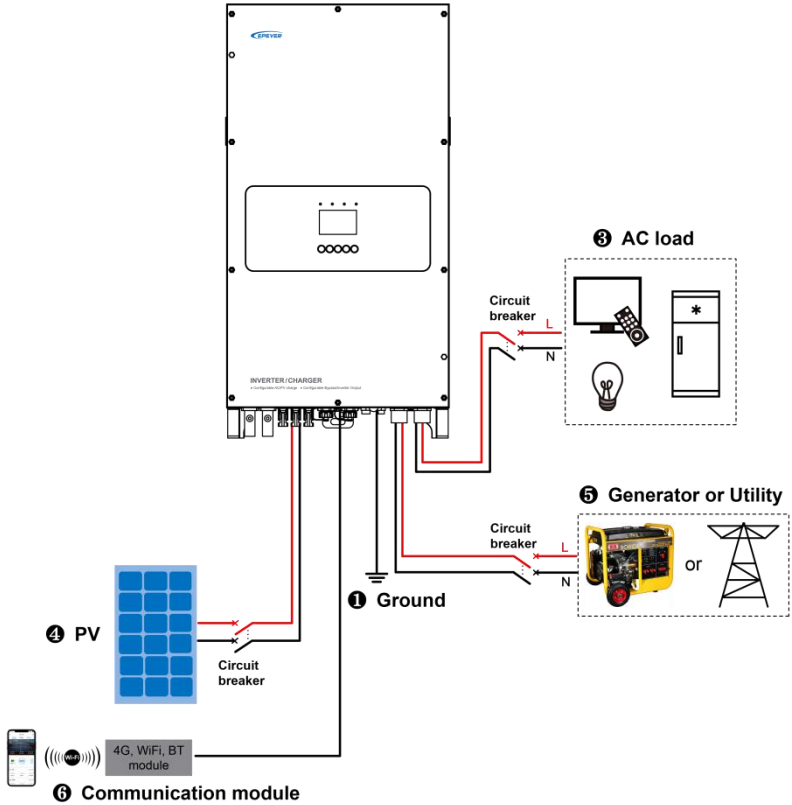
Step 4: Fix the mounting plate by screws to the wall.



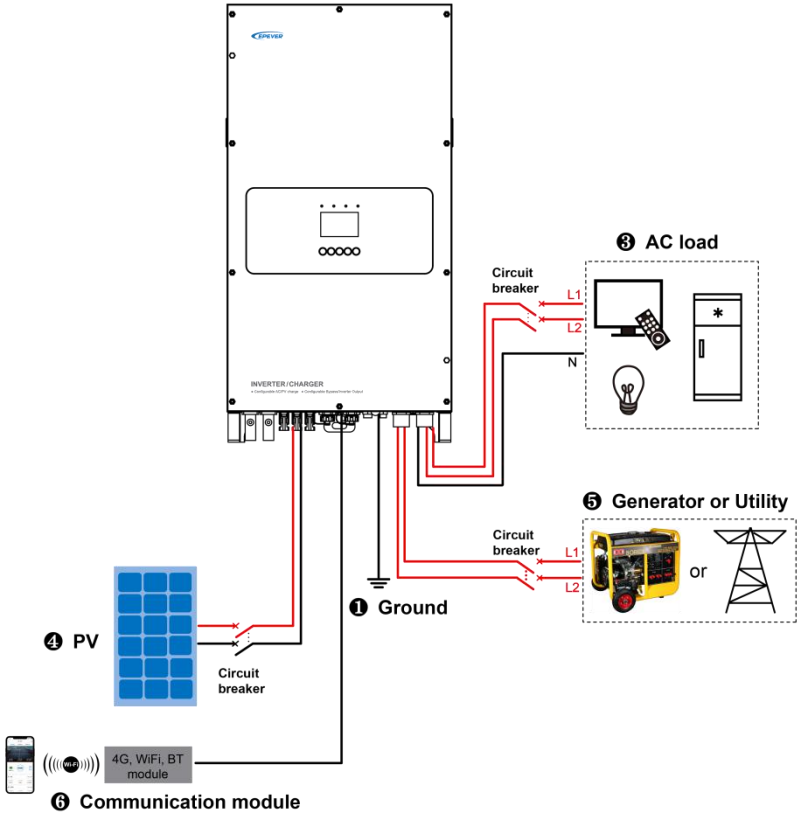
3.4 Wiring the inverter/charger

Connect the inverter/charger in the order of "❶Ground > ❷Battery > ❸Load > ❹PV > ❺Utility or Generator > ❻Optional accessories", and disconnect the inverter/charger in the reverse order. **The following wiring sequence is illustrated in the appearance of "MP3043-1020P65." For wiring positions of other models, please refer to the actual product appearance.**

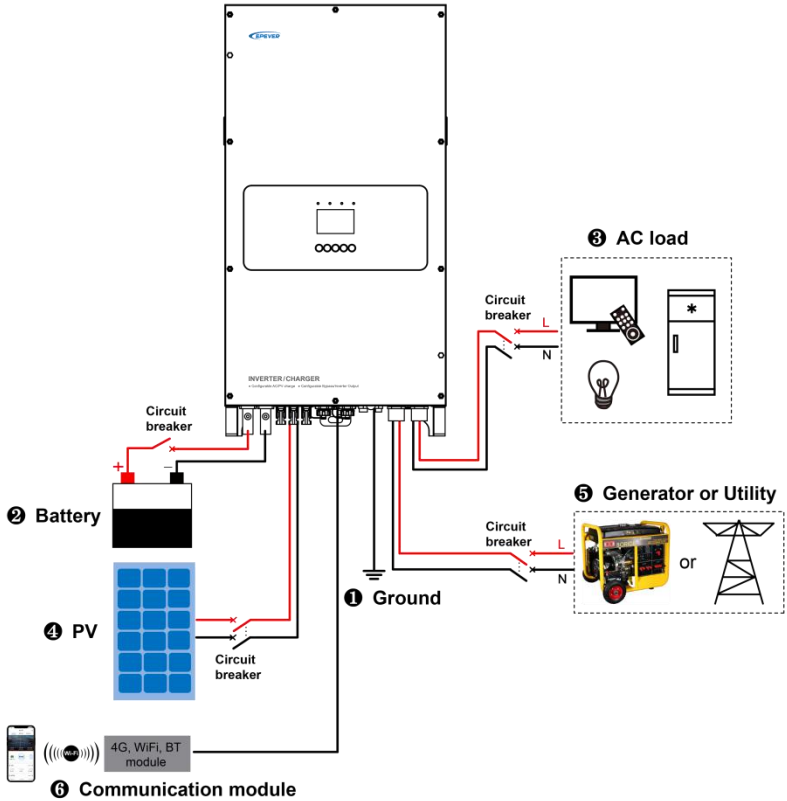
- **No battery mode in regions with single-phase power grid**



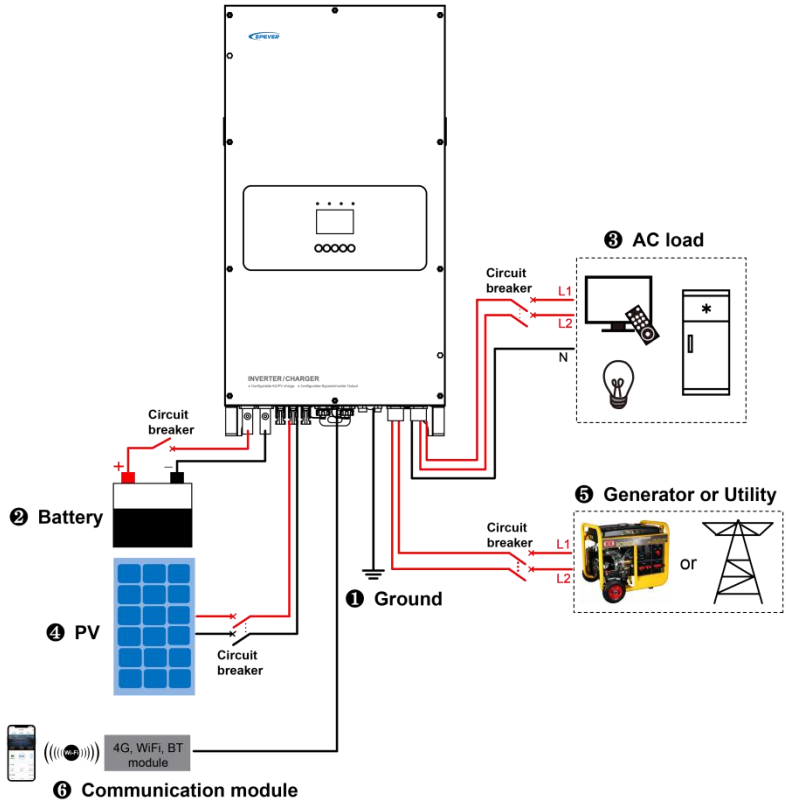
- **No battery mode in regions with split-phase power grid**



- **Battery mode in regions with single-phase power grid**



- **Battery mode in regions with split-phase power grid**

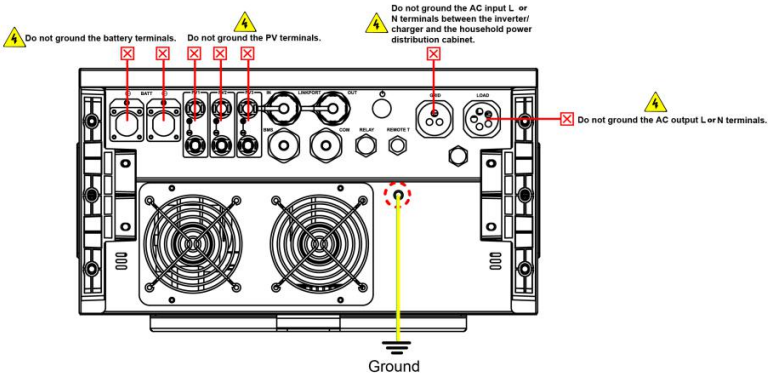


1. Grounding

The inverter/charger has a dedicated grounding terminal, which must be grounded reliably. The grounding wire size must be consistent with the recommended load wire size. The grounding connection point shall be as close as possible to the inverter/charger, and the total grounding wire shall be as short as possible.

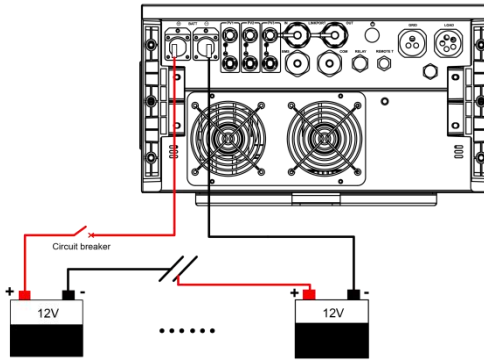
☒ **No grounding**	☒ Do not ground the battery terminals.
	☒ Do not ground the PV terminals.

	☒ Do not ground the AC input L or N terminals between the inverter/charger and the household power distribution cabinet.
	☒ Do not ground the AC output L or N terminals.
☑ **Grounding**	☑ The cabinet of the inverter/charger is connected to earth through the earth rail, along with the AC input and output's PE (Protective Earth) terminal.



2. Connect the battery

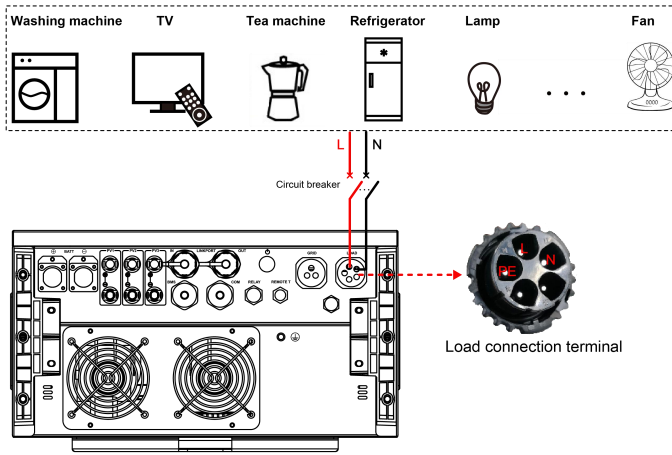
⚠ **CAUTION**	• Please disconnect the circuit breaker before wiring and ensure that the leads of the "+" and "-" poles are polarity correctly. • A circuit breaker must be installed on the battery side. For selection, please refer to chapter 3.2 Wire and breaker size.



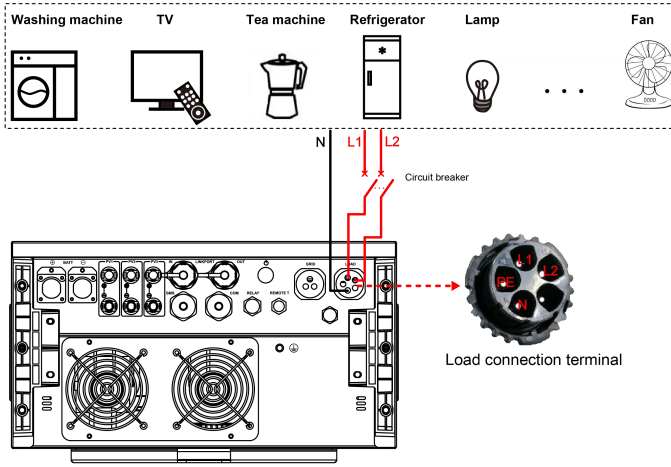
3. Connect the AC load

WARNING	• Risk of electric shock! When wiring the AC load, please disconnect the circuit breaker and ensure that the poles' leads are connected correctly. • The AC loads shall be determined by the continuous output power of the inverter/charger. The AC load's surge power must be lower than the instantaneous surge power of the inverter/charger, or the inverter/charger will be damaged.

- **Load connection diagram in regions with single-phase power grid**



- **Load connection diagram in regions with split-phase power grid**



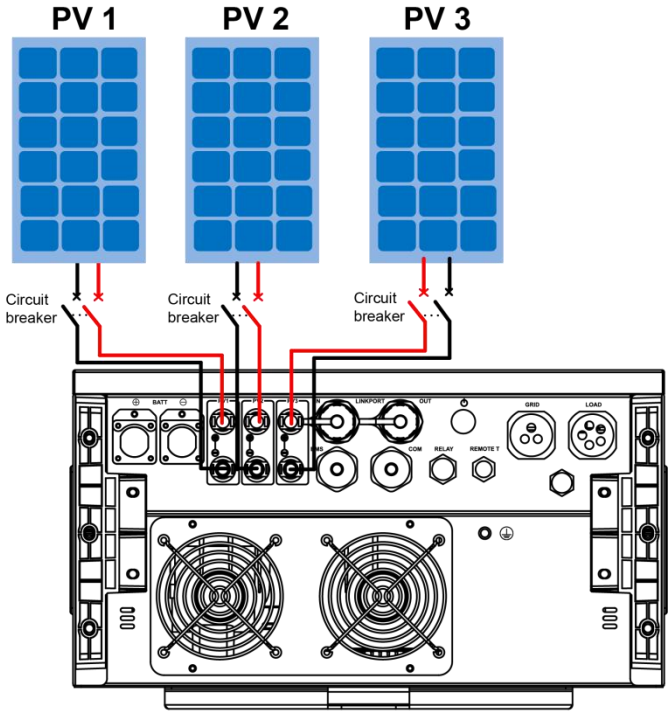
In regions with split-phase power grid (such as North America and Japan), as well as in regions with single-phase power grid, the load connection terminals are respectively shown in the above diagram.

In regions with split-phase power grid, connect different pins of the load connection terminal to obtain different AC power. Connect L1/L2 and N pins to output 110VAC to 120VAC, and connect L1 and L2 pins to output 220VAC to 240VAC. PE pin is for grounding. Connect the AC load correctly according to the letters on each pin.

In regions with single-phase power grid, connect L and N pins to output 220VAC to 240VAC, and PE pin is for grounding.

4. Connect the PV modules

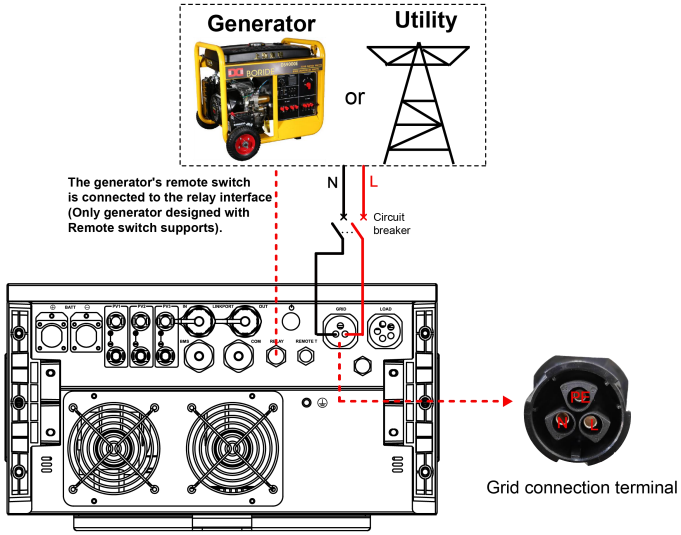
WARNING	Risk of electric shock! The PV array can generate dangerous high-voltage! Disconnect the circuit breaker before wiring, and ensure that the leads of "+" and "-" poles are connected correctly.
CAUTION	If the inverter/charger is used in an area with frequent lightning strikes, install an external surge arrester at the PV input and utility input terminals.



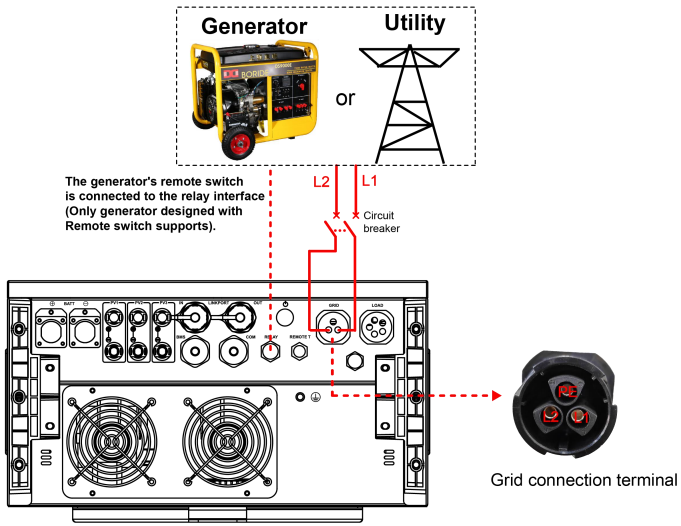
5. Connect the Utility or generator

WARNING	• Risk of electric shock! The Utility input can generate dangerous high-voltage! Disconnect the circuit breaker or fast-acting fuse before wiring, and ensure that the poles' leads are connected correctly. • After the Utility is connected, the PV and battery cannot be grounded, and the inverter/charger cover must be grounded reliably to shield the outside electromagnetic interference effectively and prevent the cover from causing electric shock to the human body.
CAUTION	• MP-P65 series, when using the oil engine as AC input, can be compatible with most oil engines on the market.

- **Utility or generator connection diagram in regions with single-phase power grid**



- **Utility or generator connection diagram in regions with split-phase power grid**

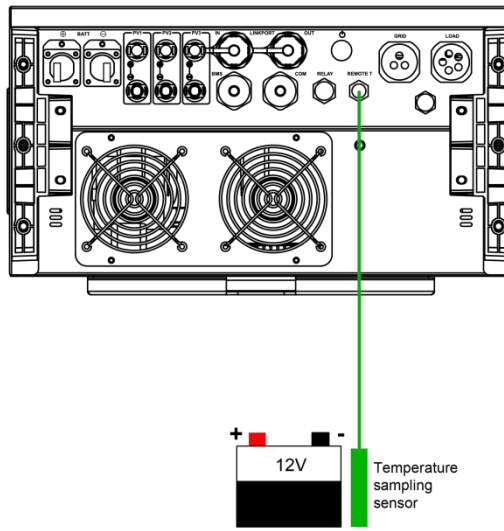


6. Connect optional accessories

A. Connect the remote battery temperature sensor cable

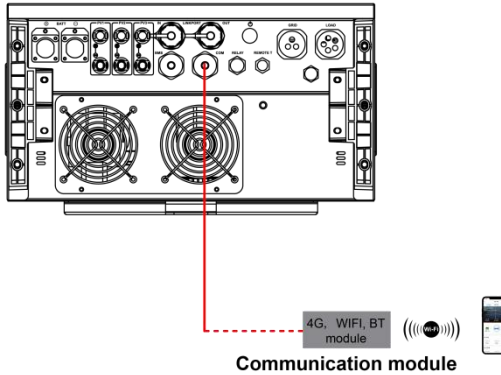
Connect one end of the remote battery temperature sensor cable to the **REMOTE T** interface port and place the other end close to the battery.

CAUTION	Under the non-lithium battery system or lithium batteries that do not have temperature sampling,the charging or discharge will be compensated according to the temperature after connecting an external temperature sensor. When the temperature sensor is damaged or disconnected, the charged and discharged without temperature compensation.



B. Connect the communication module

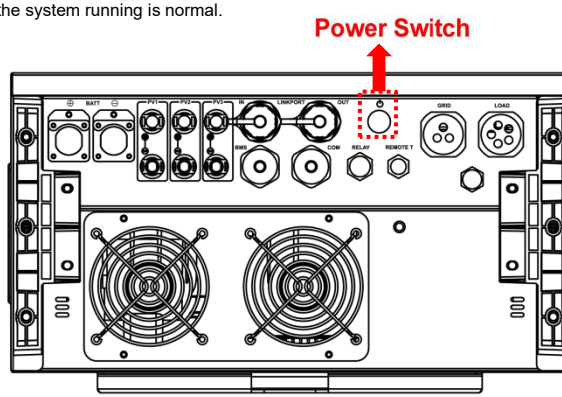
Connect the WiFi module, 4G module, or Bluetooth module to the RS485 com. port. End-users can remote monitor the inverter/charger or modify related parameters on the phone APP. Refer to the user manual of Cloud APP, WIFI module, 4G module, or Bluetooth module for specific settings.



3.5 Operate the inverter/charger

Step 1: Double-check whether the wire connection is correct.

Step 2: Connect the battery circuit breaker and turn on the power switch (keep flicks). The LCD will be lit, which means the system running is normal.



WARNING	First to turn off the circuit breaker of the battery. After the inverter/charger normally works, connect the PV array and utility circuit breakers later. Otherwise, we won't assume any responsibility for not following the operation. The AC output is ON by default after the inverter/charger is powered. Before turning on the power switch, ensure the AC output is connected to loads correctly, and no safety hazard exists.

Step 3: Set parameters by the buttons.

CAUTION	For detailed parameters setting, refer to chapter 3.4 Parameters setting.

Step 4： Use the inverter/charger.

Connect the load circuit breaker, the PV array circuit breaker, and the utility circuit breaker in sequence and plug the utility's socket. After the AC output is normal, turn on the AC loads one by one. Do not turn on all the loads simultaneously to avoid protection action due to a large transient impulse from the current. The inverter/charger will perform normal work according to the set working mode. See chapter 2.4 Interface

CAUTION	• When supplying power for different AC loads, turning on the load with a larger impulse current first is recommended. After the load output is stable, turn on the load with a smaller impulse current later. • If the inverter/charger cannot work properly or LCD/indicator shows abnormality, please refer to chapter 7 Troubleshooting or contact our after-sales.

4 Parallel Installation

MP-P65 series support parallel operation for multiple units in single-phase or three-phase, with a maximum of 6 units in parallel. After correctly connecting the inverter/charges according to the wiring diagrams of single-phase parallel or three-phase parallel, the phase can be switched to single-phase or three-phase (Phase A, B & C) through the LCD. Single-phase parallel output voltage is 110VAC to 120VAC or 220VAC to 240VAC, and three-phase output voltage is 380VAC to 415VAC.

4.1 Wire and breaker size for parallel operation

- **Recommended battery wire and breaker size when connecting a single inverter/charger.**

Model	Battery wire size	Breaker size
MP3043-1020P65	20mm^2/4AWG	2P—150A/125VDC
MP5043-1020P65	35mm^2/2AWG	2P—250A/125VDC

WARNING	You need to connect the battery cables of each inverter/charger together. Use a connector or bus-bar as a joint to connect the battery cables together, and then connect to the battery terminals. The cable size used from joint to battery should be **X** times cable size in the tables above. "**X**" indicates the number of inverter/chargers connected in parallel.

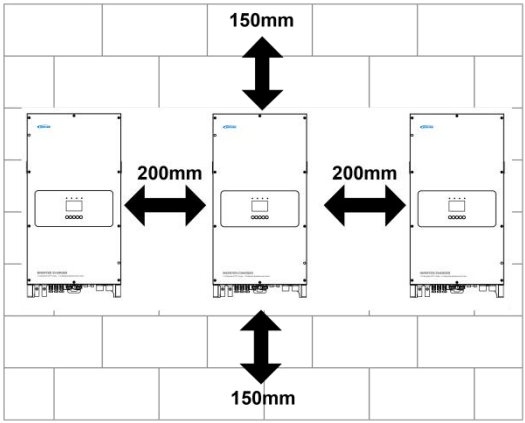
- **Recommended PV, utility, and AC output wire and breaker size**

In parallel installation, the wire and breaker size for PV, utility and AC output are the same as in single installation, refer to chapter 3 Single Installation to choose appropriate wire and breaker size.

4.2 Precautions for parallel installation

- **Determine the installation location**

For proper air circulation to dissipate heat, the inverter/charger requires a clearance of approx. 200mm left and right to unit and approx. 150mm above and below the unit.



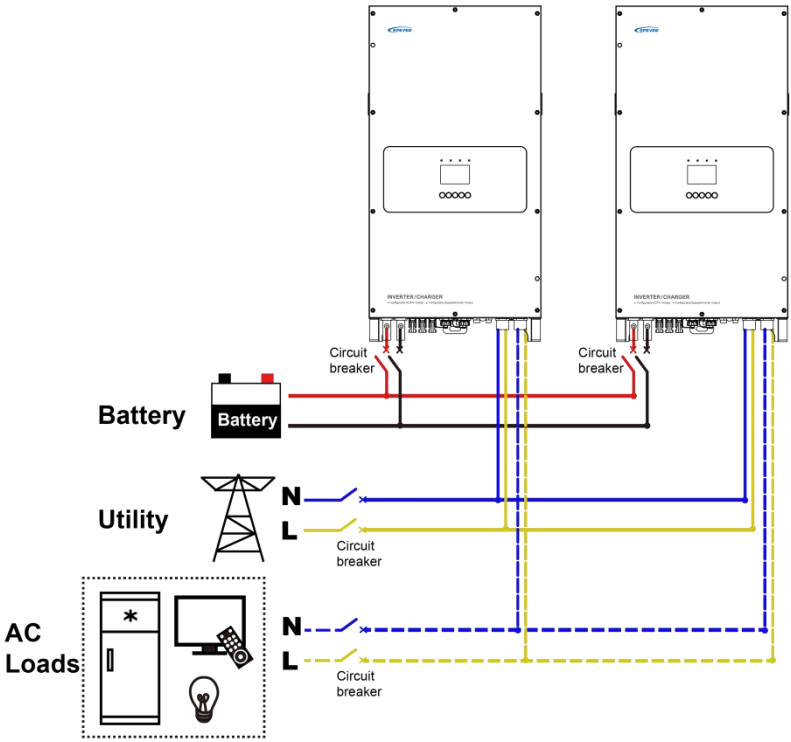
WARNING	• Please disconnect the circuit breaker before wiring and ensure that the leads of the "+" and "-" poles are polarity correctly. • Each inverter/chargers must be connected to one battery pack, with the length of the connecting wire from each inverter/charger to the battery pack being the different.
WARNING	• In the parallel system, ensure that the Utility input wire size and length of all inverter/chargers are the same. Otherwise, it will result in significant differences for the input power, which will affect the normal operation and lifespan. • In the parallel system, ensure that the AC load wire size and length of all inverter/chargers are the same. Otherwise, it will result in significant differences for the input power, which will affect the normal operation and lifespan. • Disconnect all circuit breakers in the system when making electrical connections in the parallel system, otherwise danger may occur.

4.3 Parallel operation in single-phase

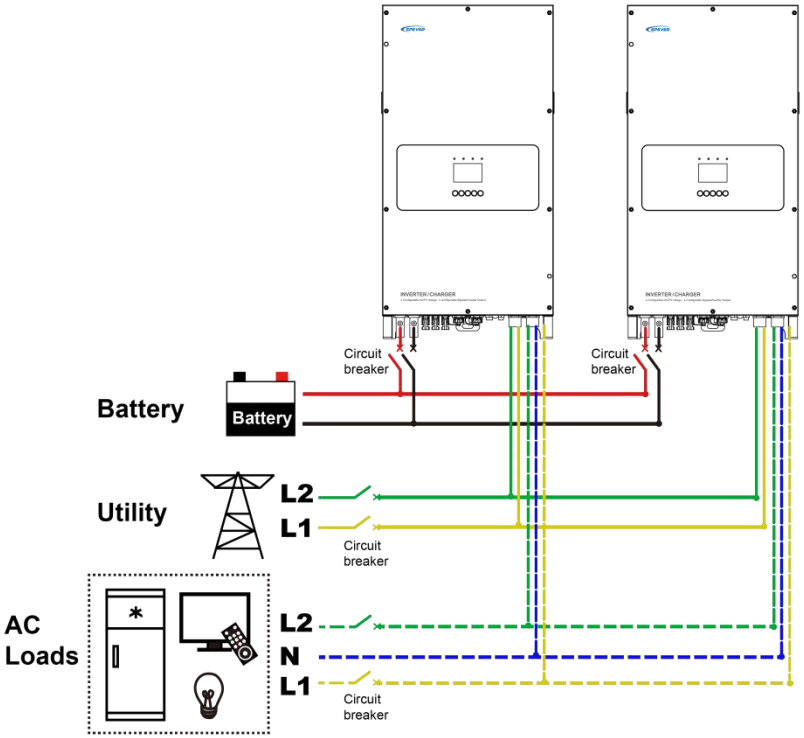
4.3.1 Single-phase parallel wiring diagram

Two inverter/chargers in single-phase parallel

- **Connect the battery, utility and load in regions with single-phase power grid**

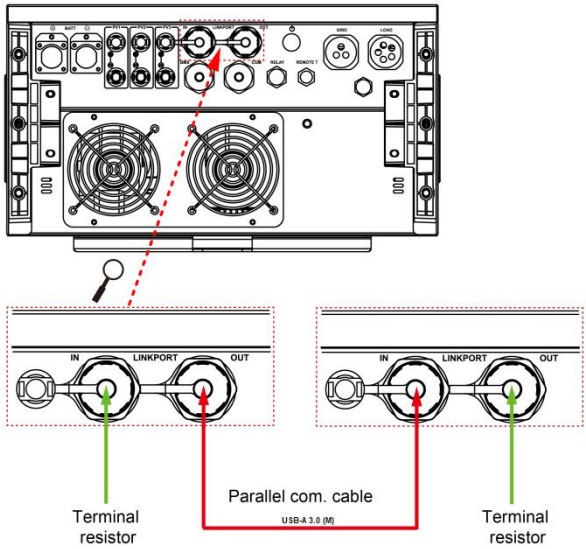


- **Connect the battery, utility and load in regions with split-phase power grid**



- **Connect the parallel communication cables**

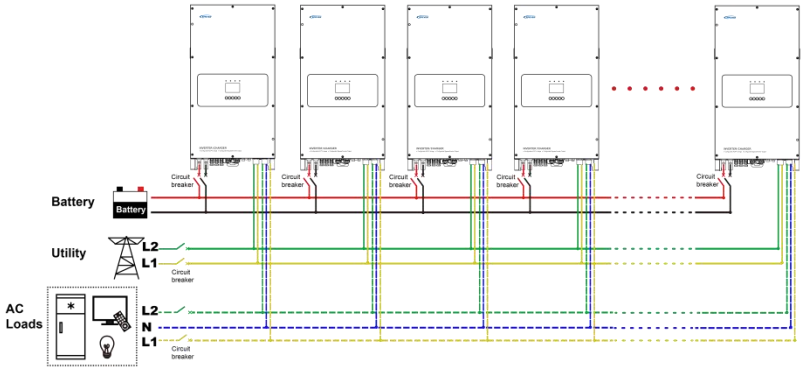
1. Connect the parallel communication ports (USB-A 3.0 ports) on the side of each inverter/charger by the parallel communication cables.
2. Connect the CAN bus terminal resistor (USB-A 3.0 connector) ,included accessory, to the parallel communication ports (USB-A 3.0 ports) of the first and last inverter/charger.



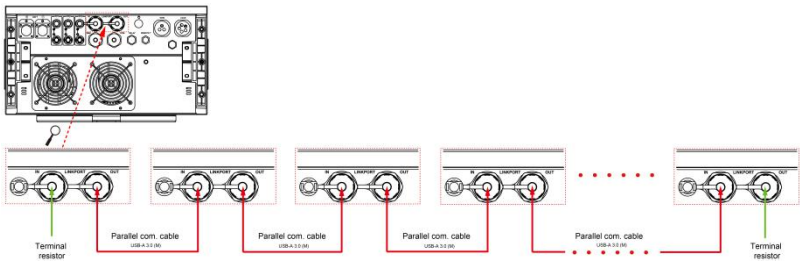
Three or more inverter/chargers in single-phase parallel

- **Connect the battery, utility and load in regions with single-phase power grid**

- **Connect the battery, utility and load in regions with split-phase power grid**



- **Connect the parallel communication cables**



- **Connect PV**

PV connection refers to chapter “3 Installation>3.4Wiring the inverter/charger>Connect the PV modules”.

WARNING	Each inverter/charger should be connected to PV modules separately, and it is prohibited to connect the same PV modules to two or more inverter/chargers.

4.3.2 Debug for single-phase parallel

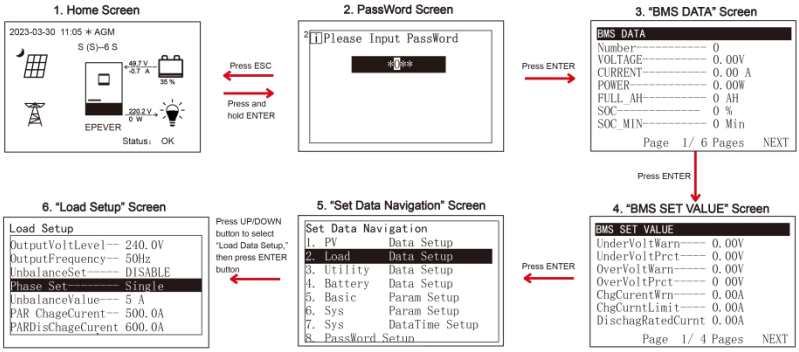
Step 1: Double check the parallel wiring according to the following requirements before debugging:

- Ensure that the wires are connected correctly according to the wiring diagram, and do not reverse connect.
- Ensure that the wiring of AC input and AC output are connected separately and uniformly

connected to the combiner box or busbar. Otherwise, uneven loading of each inverter/charger in the bypass mode will occur.

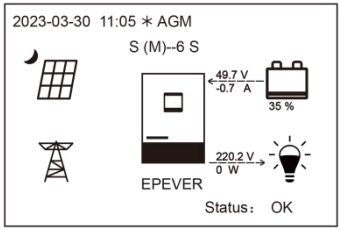
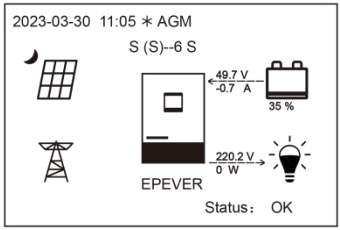
- Ensure that all circuit breakers for the battery, utility input, load side and PV are disconnected.

Step 2: Connect the circuit breakers on the battery side in sequence to turn on each inverter/charger, set the phase of each inverter/charger to "Single" through LCD, then turn off the inverter/chargers before restarting. See the example of "Phase Set" on the slave unit for six inverter/chargers in single-phase parallel below.



CAUTION	After modifying the "Phase Set", restart the inverter/charger, after which the modifying is finished. Follow the above flowchart to re-enter the "Load Data Setup" interface and check if the "Phase Set" is correct. Another way is to observe whether the phase setting on the screen is successful after powering on at least 2 parallel units. Set the "PAR ChargeCurrent" and "PARDisChargeCurrent" according to the quantity of parallel units.
WARNING	Only after the phase settings of all parallel equipment are successful can the output circuit breaker can be connected.

Step 3: Turn on each inverter/charger, the parallel status icon will display. Take the example of single-phase parallel operation of 6 units as below for example. For other numbers of units in single-phase parallel operation, only the "number of parallel" displays differently.

Parallel in single-phase, Master unit: S (M)-6 S	Parallel in single-phase, Slave unit: S (S)-6 S
	

CAUTION	If the parallel status icon displayed on the LCD is consistent with the actual phase and startup quantity of the inverter/chargers, it indicates that the phase setting and parallel communication have been successful. If the number of parallel status icon displayed is less than the actual startup quantity, or an Err80 fault is reported, please check if there is a loose connection for the parallel communication cable and ensure two inverter/chargers are started up at least. If the inverter/charger displays Err82 fault (i.e., there is an unset phase in the system), please check if the “phase setting” is successful. If the inverter/charger displays Err90 or Err98 fault, check if the "BAT Have" setting value of the master and slave inverter/charger are consistent, correct and restart the inverter/charger.

Step 4: Connect all AC breakers on the utility input, and the utility input of all inverter/chargers must be connected to the same utility.

WARNING	When connecting the utility for bypass charging, if only the utility breaker of a certain inverter/charger is disconnect, be careful that the utility input terminals of this inverter/charger still have power.

Step 5: If there is no fault alarm, indicates the single-phase parallel system is completely installed.

Step 6: Please connect all circuit breakers on the load side, and the parallel system will start to provide power to the load. **Note: To avoid overload, it is best to put the entire system in operation before connecting the load side circuit breakers.**

WARNING	First, connect the breaker of the battery to ensure the inverter/charger operates normally. And then connect the breakers of PV and utility. If do not follow this operation sequence, you should be responsible for any damage to the

	inverter/charger. After the inverter/charger is powered on, the AC output is turned on by default. Before turning on the power switch of the inverter/charger, please confirm that the AC output is correctly connected to the load and there is no safety hazards present.

4.4 Parallel operation in three-phase

4.4.1 Three-phase parallel wiring diagram

When paralleling in three-phase(Phase A, Phase B and Phase C), the number of parallel units in each phase is arbitrarily specified by the user. The user can increase the number of parallel units in Phase A, Phase B, or Phase C according to actual needs to expand the capacity of a certain phase. For example, four inverter/chargers can be set for Phase A, one for Phase B and one for Phase C. The wiring method for increasing or decreasing the inverter/chargers in Phase A, B and C is similar.

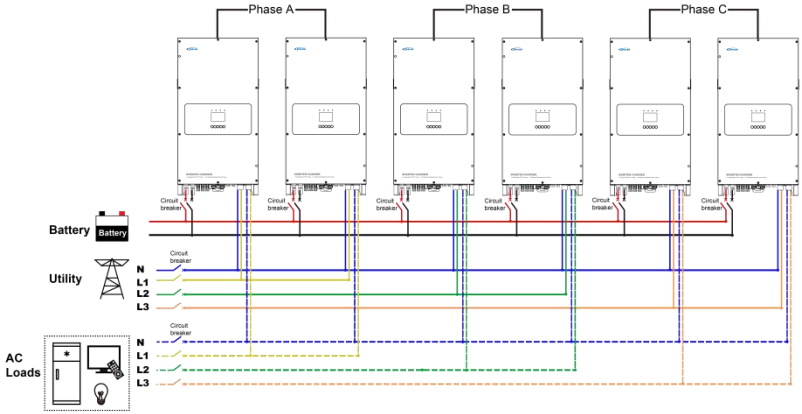
Note: In the following connection diagrams, the grid connection terminal and load connection terminal are defined as shown below (as per the pin connection in regions with single-phase power grid)

Grid connection terminal

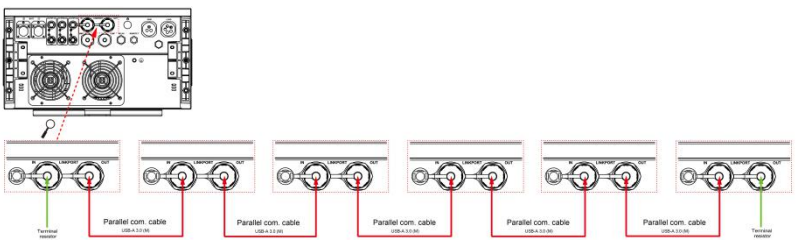
Load connection terminal

Two for Phase A, two for Phase B, and two for Phase C

- **Connect the battery, utility and load**

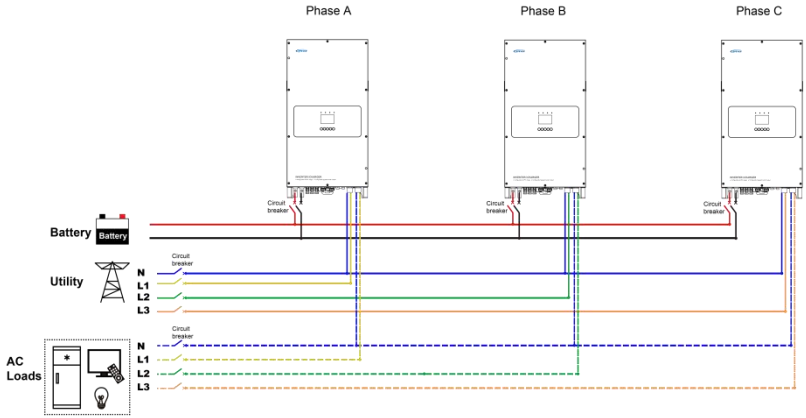


- **Connect the parallel communication cables**
- Connect the parallel communication port (USB-A 3.0) on the side of each inverter/charger by the parallel communication cables.
- Connect the CAN bus terminal resistor(USB-A 3.0 included accessory),to the parallel communication ports of the first and last inverter/charger.

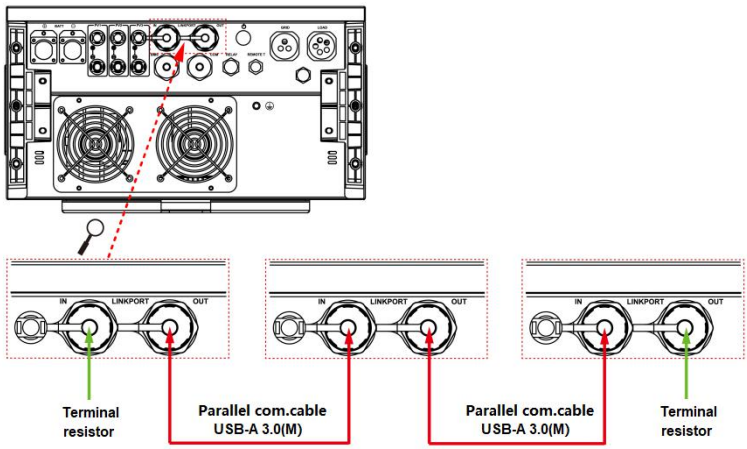


One for Phase A, one for Phase B, and one for Phase C

- **Connect the battery, utility and load**

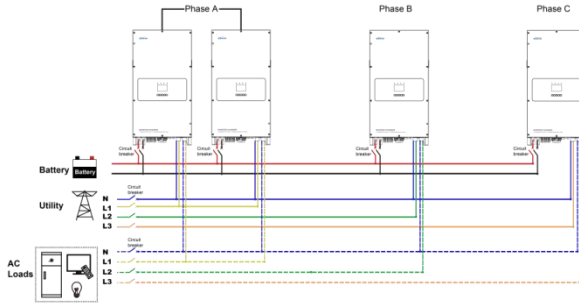


- **Connect the parallel communication cables**

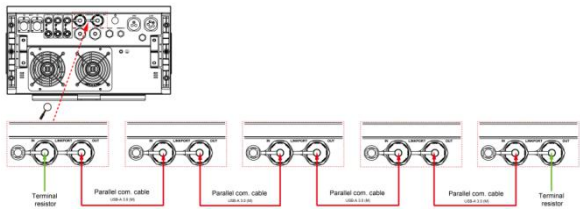


Two for Phase A, one for Phase B, and one for Phase C

- **Connect the battery, utility and load**

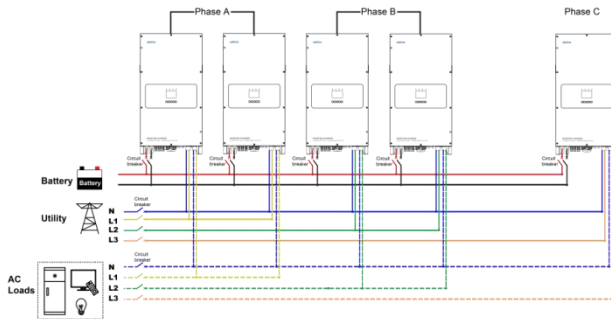


- **Connect the parallel communication cables**

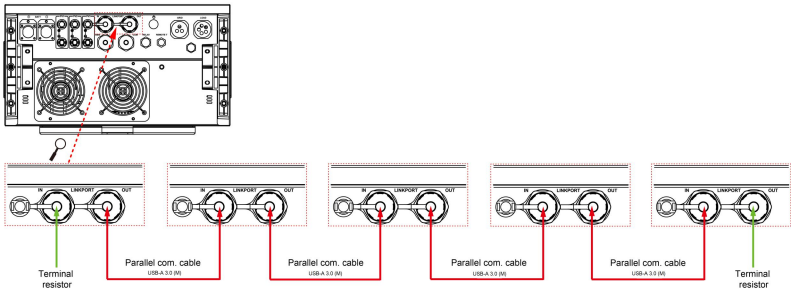


Two for Phase A, two for Phase B, and one for Phase C

- **Connect the battery, utility and load**

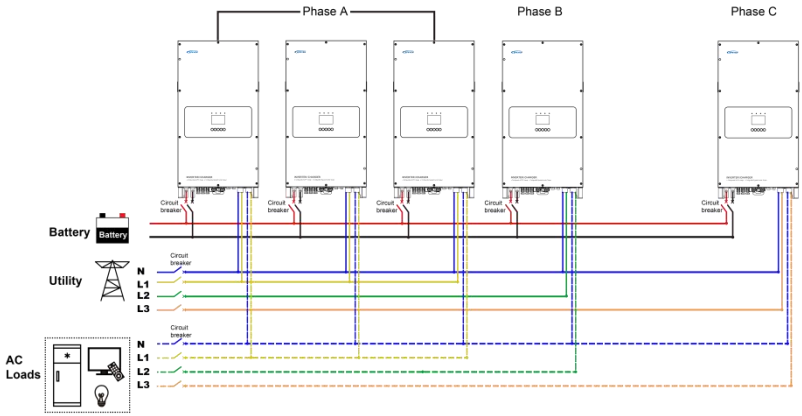


- **Connect the parallel communication cables**

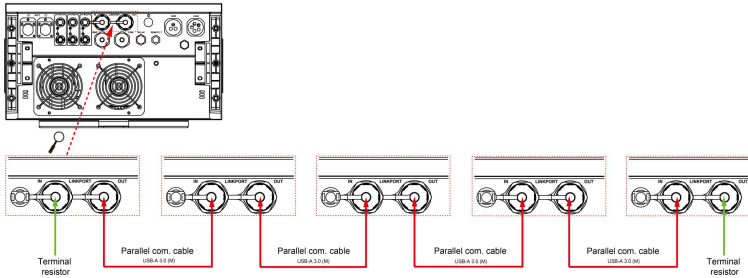


Three for Phase A, one for Phase B, and one for Phase C

- **Connect the battery, utility and load**

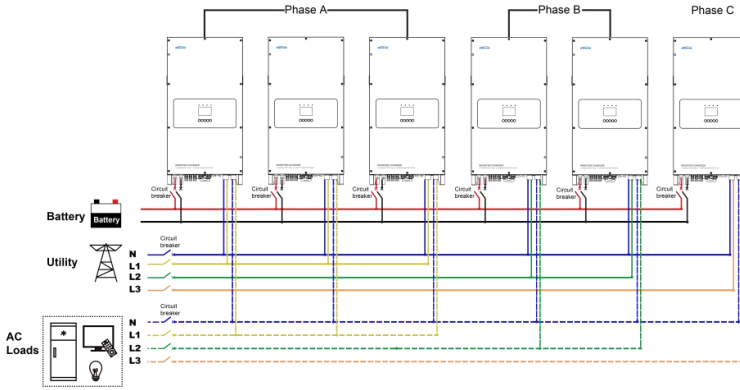


- **Connect the parallel communication cables**

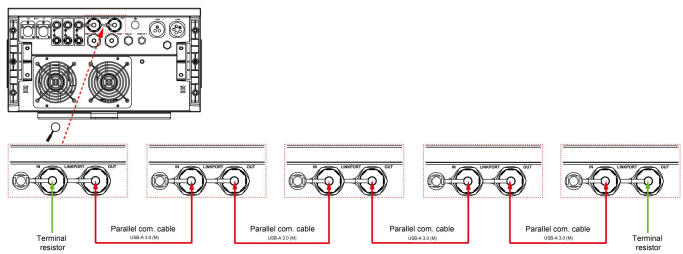


Three for Phase A, two for Phase B, and one for Phase C

Connect the battery, utility and load

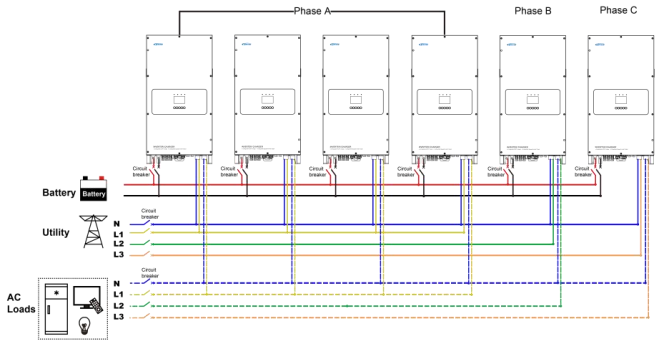


- **Connect the parallel communication cables**

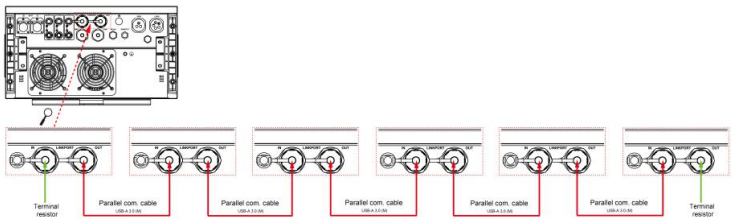


Four for Phase A, one for Phase B, and one for Phase C

- **Connect the battery, utility and load**



- **Connect the parallel communication cables**



- **Connect PV**

PV connection refers to chapter “3. Single Installation > Wiring the inverter/charger > Connect the PV modules”.

WARNING	Each inverter/charger should be connected to PV modules separately, and it is prohibited to connect the same PV modules to two or more inverter/chargers.

4.4.2 Debug for three-phase parallel

Step 1: Double check the parallel wiring according to the following requirements before debugging:

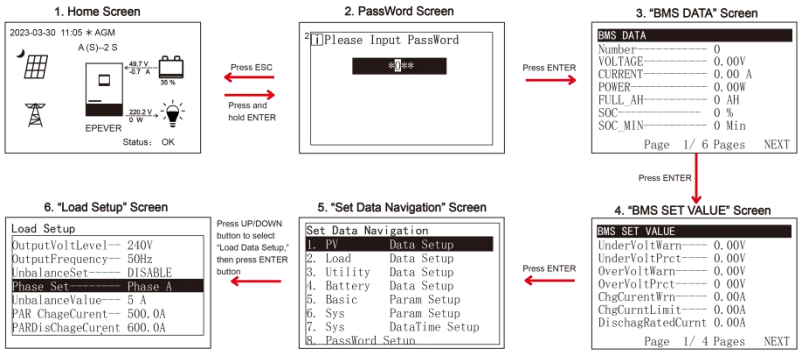
- Ensure that the wires are connected correctly according to the wiring diagram, and do not reverse connect.

- Ensure that the wiring of AC input and AC output are connected separately and uniformly connected to the combiner box or busbar. Otherwise, it will cause uneven loading of each inverter/charger in the bypass mode.
- Ensure that all breakers for the battery side, utility input side, load side and PV side are open.

Step 2: Connect the circuit breakers on the battery side in sequence to turn on each inverter/charger, set the phase of each inverter/charger to “Phase A/B/C” through LCD, then turn off the inverter/chargers for 10 seconds before restarting. See the example of screen display on the slave unit for two inverter/chargers below.

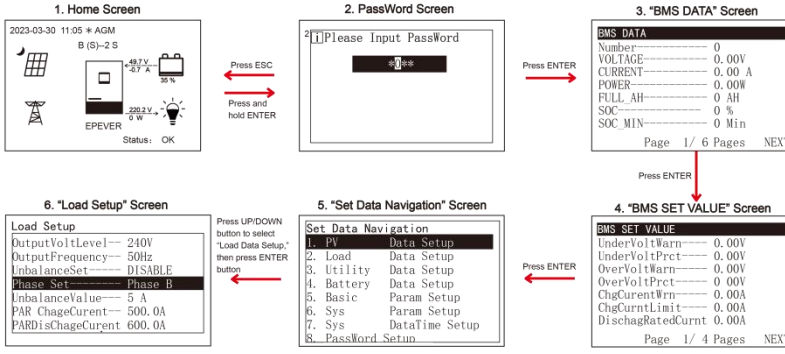
- **Parallel parameters setting for Phase A**

After three-phase wiring is completed, the “Phase Set” of each inverter/charger in Phase A needs to be changed to “Phase A.” See the example of screen display on the slave unit for two inverter/chargers in Phase A below.



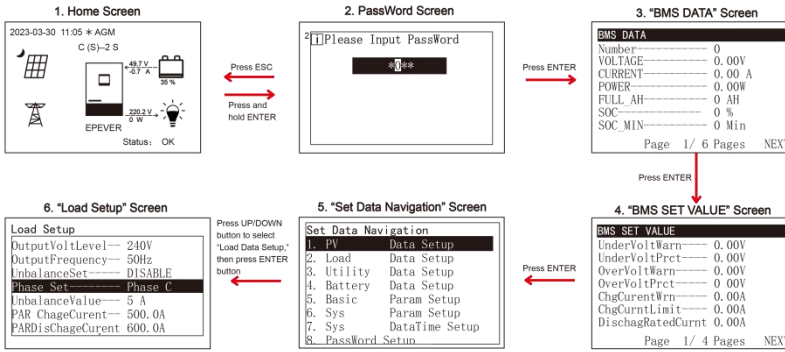
- **Parallel parameters setting for Phase B**

After three-phase wiring is completed, the “Phase Set” of each inverter/charger in Phase B needs to be changed to “Phase B.” See the example of screen display on the slave unit for two inverter/chargers in Phase B below.



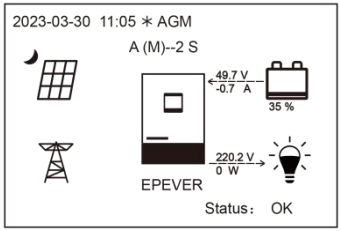
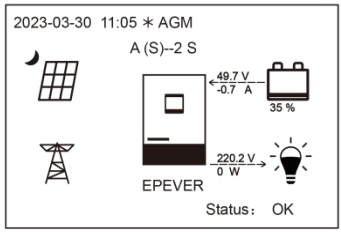
- **Parallel parameters setting for Phase C**

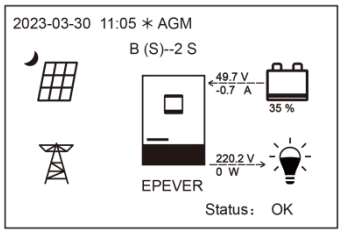
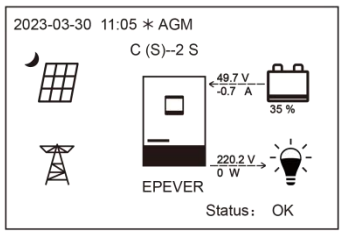
After three-phase wiring is completed, the "Phase Set" of each inverter/charger in Phase C needs to be changed to "Phase C."See the example of screen display on the slave unit for two inverter/chargers in Phase C below.



CAUTION	After"Phase Set"is changed, must turn off the inverter/charger for 10 seconds before restarting, only then can the setting be successful. Follow the above flowchart to re-enter the "Load Data Setup" interface and check if the "Phase Set" is correct; Or after starting at least 2 parallel equipment, observe whether the phase setting on the screen of the set equipment is successful.
WARNING	Only after the phase settings of all parallel equipment are successful can the output circuit breaker can be connected.

Step 3: Turn on each inverter/charger, the parallel status icon will display. See the example of three-phase parallel operation of 6 units as below (2 units each in Phase A, B and C). For other numbers of units in three-phase parallel operation, only the “number of parallel” displays differently.

Master unit in Phase A : A (M)-2 S	Slave unit in Phase A : A (M)-2 S
	

Slave unit in Phase B:B (S)-2 S	Slave unit in Phase C: C (S)-2 S
	

CAUTION	When parallel operation in three-phase, Master unit(M) only displays on the screen of one of the inverter/chargers in Phase A. The inverter/chargers in Phase B or C will not display Master(M), but only display Slave(S). If the LCD doesn’t display parallel status icon after startup, please check if the parallel wiring of each inverter/charger is correct, if there is any loose connection, and make sure at least 2 units are turned on and online, only then parallel status icon will be displayed.
WARNING	After the inverter/chargers are turned on, the load circuit breaker can only be connected after ensuring the phases are set correctly through the home screen or parameters “Phase Set”.
	When the inverter/chargers are installed in three-phase, and connect the utility input

WARNING	to Phase A, B and C, make sure the phase connection is the same as the setting in “Phase Set”. Or when “Phase Set” of the inverter/charger is set as “Phase A/B/C”, the utility input can be connected according to the line sequence of A/B/C, B/C/A and C/A/B.
 **CAUTION**	If the parallel status icon displayed on the LCD is consistent with the actual phase and startup quantity of the inverter/chargers, it indicates that the phase setting and parallel communication have been successful. If the number of parallel status icon displayed is less than the actual startup quantity, or an Err80 fault is reported, please check if there is a loose connection for the parallel communication cable and ensure two inverter/chargers are started up at least. If the inverter/charger displays Err82 fault (i.e., there is an unset phase in the system), please check if the “Phase Set” is successful.

Step 4: Connect all AC breakers on the utility input side of all inverter/chargers, and the utility input of all inverter/chargers must be connected to the same three-phase utility. And the input three-phase utility should match the phase setting of the inverter/chargers, so that the inverter/chargers can work normally.

 **WARNING**	When connecting to the Utility for bypass charging, if disconnect the Utility breaker of a certain inverter in the parallel system, be careful that the Utility input of the inverter still has power!

Step 5: If there is no fault alarm, indicates the three-phase parallel system is successfully installed.

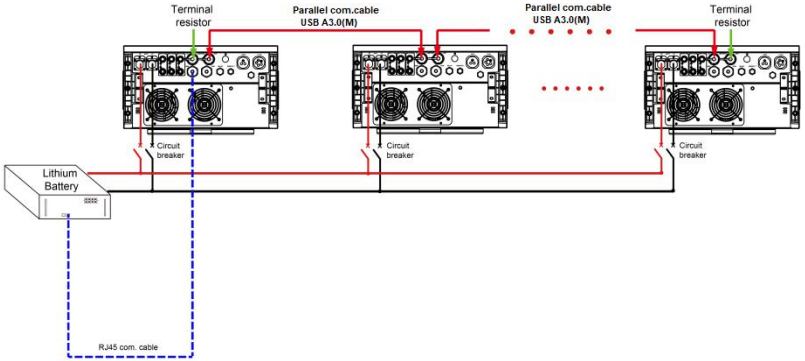
Step 6: Please connect all circuit breakers on the load side, and the parallel system will start to provide power to the load. **Note: To avoid overload, it is best to put the entire system in operation before connecting the load side circuit breakers.**

 **WARNING**	First, connect the breaker of the battery to ensure the inverter/charger operates normally. And then connect the breakers of PV and utility. If do not follow this operation sequence, you should be responsible for any damage to the inverter/charger. After the inverter/charger is powered on, the AC output is turned on by default. Before turning on the power switch of the inverter/charger, please confirm that the AC output is correctly connected to the load and there is no safety hazards present.

4.4.3 BMS connection for parallel equipment

4.4.4 BMS wiring diagram for parallel

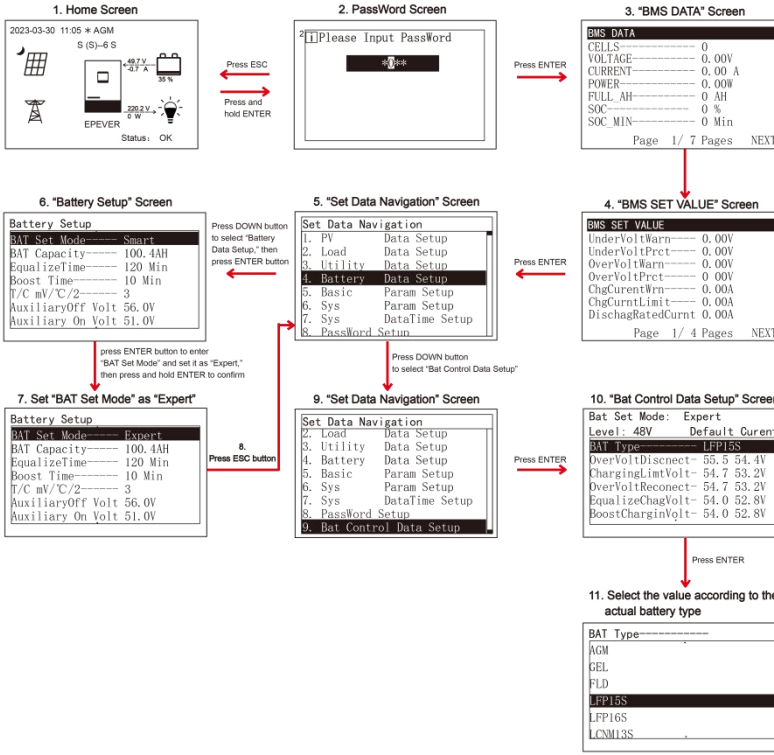
In either single-phase application or three-phase application, lithium batteries can be connected to the BMS communication port of any inverter/charger through the BMS communication cable. All parallel equipment must be connected to the same lithium battery bank. Wiring diagram is as below:



4.4.5 BMS parameter setting for parallel

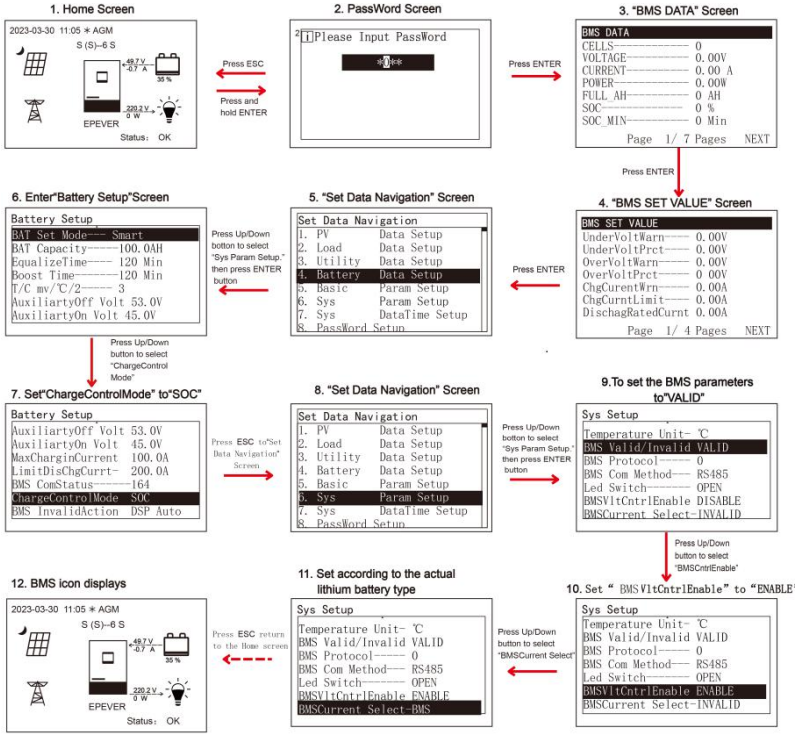
- **Select battery type**

  When using BMS to control battery charging and discharging, change LCD to choose the correct battery type according to the actual used battery. The specific operation steps are as follows:



- **To setting the "Charging and discharging," BMS Valid/Invalid, BMS voltage control enable, BMS current control choose."**

  After BMS connection is completed, related BMS parameters need to be set on the LCD of the connected inverter/charger, to set "BMS Valid/Invalid" as "VALID," set "BMSVltCntrlEnable" as "ENABLE," and the "BMS current control choose" set as the requirements for lithium battery type based on actual use (reference 2.5.4 Battery work modes) .Other BMS setting parameters need to remain in the factory default state (refer to chapter 2.5.1 Parameters list) to avoid abnormal operation of the inverter/charger. Operation is shown as below:



WARNING	In the process of BMS connection for parallel, the inverter/charger that do not connect to the BMS communication will to set "BMS Valid/Invalid" as "VALID." Otherwise, the inverter/charger that does not connected will be reported to Err122 (BMS communications failure).

- **Set BMS protocol**

Step 1: Based on the manufacturer information of the lithium battery connected to the inverter/charger, determine the lithium battery conversion communication protocol number PRO (Go to EPEVER website and download the "BMS Communication Protocols & Fixed ID" file to obtain the corresponding PRO numbers for different lithium battery manufacturers).

Step 2: According to the above flowchart 1 to 9, set the "BMS Protocol" to the value consist with the PRO

number.

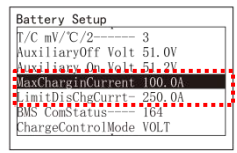
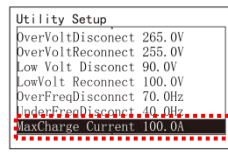
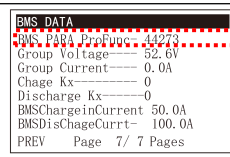
Step 3: After setting the BMS parameters, return to the home screen, where the word “BMS” is displayed in the upper right corner, indicating the BMS connection is successful.

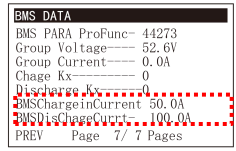
4.4.6 BMS control logic for charging and discharging

In either single-phase application or three-phase application, after the BMS is correctly connected and BMS parameters are set correctly, the system will follow the following logic to control the charging and discharging of lithium battery.

- **Description of relevant parameters**

The BMS control logic for charging and discharging involves the following parameters. Please first enter the corresponding interface to view the values of each parameter.

Parameter	Interface	Description
MaxChargin Current LimitDisChgCurrt		In “4.Battery Setup” interface, click the "UP/DOWN" button to view the parameter. This parameter value supports modification, and the setting range refers to chapter 2.5.1 Parameter list
MaxCharge Current		Enter the “3. Utility Data Setup” screen, click the "UP/DOWN" button to view the parameter. This parameter value supports modification, and the setting range refers to chapter 2.5.1 Parameter list.
BMS PARA ProFunc①		Enter the “BMS DATA” screen, click the "UP/DOWN" button to view the parameter. This parameter value is read from BMS automatically. When connecting to a single battery pack, it shows 0. When multiple battery packs are connected in parallel, it shows 44273.

ChgCurntLimit① DischagCurntLimit①		Enter the “BMS DATA” screen, click the "UP/DOWN" button to view the parameter. No matter a single battery pack is used or multiple battery packs in parallel are used, the “Charge current Limit” of each parallel unit= “BMSCharginCurrent” divides number of parallel units online. And the “Discharge current Limit” of each parallel unit= “BMSDisChageCurrt” divides number of parallel units online.

- **Control Logic for battery pack**

Scenario		Control Logic
Charging	1. PV and utility are available 2. Only PV is available	Charge the battery according to the smaller value of “BMSCharginCurrent” divides number of parallel units online, and “MaxCharginCurrent.”
	Only utility is available	Charge the battery according to the smallest value of “BMSCharginCurrent” divides number of parallel units online, “MaxCharginCurrent,” and “MaxCharge Current.”
Discharging	---	Once the actual battery discharge current exceeds the “BMSDisChageCurrt” divides number of parallel units online, or “LimitDisChgCurrt,” LCD will display battery over-current error (Err37) after the inverter/charger runs for 1 minute. And then, the inverter/charger will restart after 30 seconds protection. Then the inverter/charger continues to perform the above operations repeatedly.

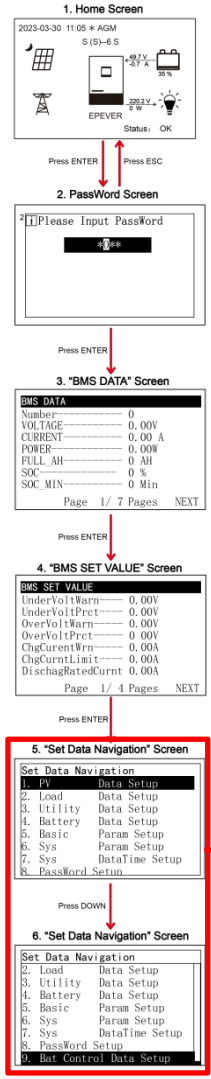
CAUTION	If the parameters read from the BMS include the BMSCharginCurrent and BMSDisChageCurrt (viewed through the "BMS DATA" screen), set the MaxCharginCurrent, LimitDisChgCurrt (set through the "Battery Data Setup" screen), and the MaxCharge Current (set through the "Utility Data Setup" screen) according to the above "Control Logic for battery pack” and to avoid damage to the battery caused by unsuitable battery charging and discharging.

CAUTION	If the parameters read from the BMS include the BMSCharginCurrent and BMSDisChageCurrt (viewed through the "BMS DATA" screen), set related parameters according to the “2.5.4 Battery work modes” in the user manual.

4.5 Parameters sync update item

Power on the inverter/charger, after the communication is normal, part of the parameters of the slave device will automatically synchronize with that of the host device. When the operation is normal, the parameters on the other inverter/chargers will be update automatically when setting the parameters in the following table on the LCD of any inverter/charger.

Note: For the definition and setting range of the following parameters, refer to chapter 2.5.1 Parameter List.



LCD interface	When the following parameters are set on any inverter/charger, it will be automatically synchronized to all the other inverter/chargers.	
Load Data Setup	*OutputVoltLevel *OutputFrequency *Phase Set (Note: After setting these parameters, it will only take effect after restarting all the inverter/chargers.)	UnbalanceSet UnbalanceValue PAR ChageCurent PARDisChageCurent
Utility Data Setup	*OverVoltDisconnect *OverVoltReconnect *Low Volt Disconnect *LowVolt Reconnect *OverFreqDisconnect *UnderFreqDisconnect (Note: After setting these parameters, it will only take effect after restarting all the inverter/chargers.)	MaxCharge Current MaxUtiltyInCurent
Battery Data Setup	BAT Capacity EqualizeTime Boost Time T/C mV/℃/2 AuxiliaryOff Volt Auxiliary On Volt MaxChargInCurrent LimitDisChgCurrt ChargeControlMode Full Discnnct Soc FulDiscnctRecvSoc	UnderEngyAlarmSoc LwEgyDnctRecvrSoc LowEngyDiscnctSoc UtiltyChargeOnSoc UtiltyChargeOfSoc SOC BAT Capacity LimitChgTemp LimitDisChgTem BATOverTemp BATOverTempRecovr
Basic Param Setup	BAT Have (Note: After setting this parameters, it will only take effect after restarting all the inverter/chargers.)	Charging Mode Discharging Mode LiProtectEnbl Stand By Mode Return Factory Set

		FR Load Open/Close Invert Open/Close PV Charge Open/Close AC Charge Open/Close Charge Enable Discharge Enable
Bat Control Data Setup	Battery Type OverVoltDiscnect ChargingLimitVolt OverVoltReconect EqualizeChagVolt BoostCharginVolt FloatChagingVolt	BoostRecnectVolt LowVoltReconect UndrVltWarnRecvr UnderVolt Warn LowVoltDisconect DischrgeLimitVolt

Note: When the slave devices are powered on, parameters marked with * will not automatically synchronize the parameter values of the host device , and they need to be set manually.

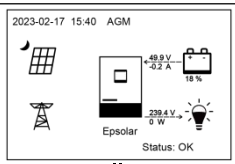
5 Working Modes

5.1 Abbreviation

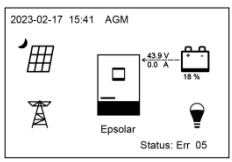
Abbreviation	Instruction
P_{PV}	PV power
P_{LOAD}	Load power
V_{BAT}	Battery voltage
LVD	Low Voltage Disconnect Voltage
LVR	Low Voltage Reconnect Voltage
LED	Low Energy Disconnect SOC
LER	Low Energy Disconnect Recover SOC
AOF	Auxiliary module OFF voltage (namely, Utility charging OFF voltage)
AON	Auxiliary module ON voltage (namely, Utility charging ON voltage)
UCF	Utility Charging OFF SOC
UCO	Utility Charging ON SOC
MCC	Battery Max. Charging Current

5.2 Battery mode

5.2.1 Scenario A: Both PV and Utility are not available.

<table>
<tr>
<td>（A）
PV ☒
Utility ☒</td>
<td>
Regardless of the input and output sources, the working mode is as follows.


$V_{BAT} \geq V_{LVR}$ / $S_{BMS} \geq$ LER || $V_{BAT} \leq V_{LVD}$ / $S_{BMS} \leq$ LED



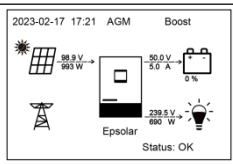
❶Any of the following is satisfied, the battery supplies the load.
• The battery voltage is greater than or equal to the LVR value.
• The battery SOC is greater than or equal to the LER value.

❷Any of the following is satisfied, the battery stops supplying the load.
• The battery voltage is lower than or equal to the LVD value.
• The battery SOC is lower than or equal to the LED value.
</td>
</tr>
</table>

CAUTION	• Set the "Charge Control Mode" as "VOLT"; the working mode is determined by the battery voltage value. • Set the "Charge Control Mode" as "SOC," the working mode is determined by the battery SOC. The battery SOC value will be more accurate after a full charge-discharge cycle when the "Charge Control Mode" is set to "VOLT," the SOC mode control is more accurate after a complete charge and discharge cycle.

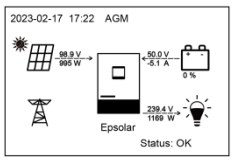
5.2.2 Scenario B: PV is available, but the Utility is not available.

（B） **PV** ☑ **Utility** ☒	**Regardless of the input and output sources, the working mode is as follows.**



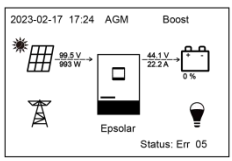
$P_{PV} > P_{Load}$ ⇄ $P_{PV} \leq P_{Load}$

❶ When the PV power is greater than the load power, the PV charges the battery and supplies extra power to the load.



$V_{BAT} \geq V_{LVR}$ / $S_{BMS} \geq LER$ ⇄ $V_{BAT} \leq V_{LVD}$ / $S_{BMS} \leq LED$

❷ When the PV power is lower than or equal to the load power, the PV and battery simultaneously charge the load.

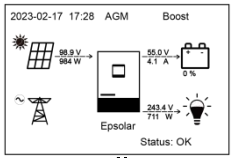


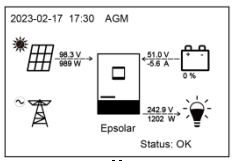
❸ If any of the following is satisfied, the PV and the battery stop supplying power to the load, and the PV charges the battery only.

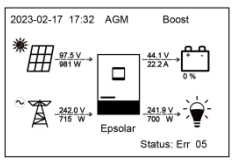
- The battery voltage is lower than or equal to the **LVD** value.
- The battery SOC is lower than or equal to the **LED** value.

Note: When the battery voltage is greater than or equal to the LVR value, or the battery SOC is greater than or equal to the LER value, the working mode returns to state ❷.

5.2.3 Scenario C: Both PV and Utility are available.

<table>
<tr><td rowspan="2">（C-1）
PV ☑
Utility ☑</td><td>Charging Mode: "Solar"</td><td>Discharging Mode: "PV>BP>BT" or "PV>BT>BP"</td></tr>
<tr><td>


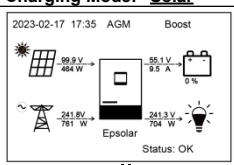
$P_{PV} > P_{Load}$ ⇅ $P_{PV} \le P_{Load}$


$V_{BAT} \ge V_{LVR}$ / $S_{BMS} \ge LER$ ⇅ $V_{BAT} \le V_{LVD}$ / $S_{BMS} \le LED$


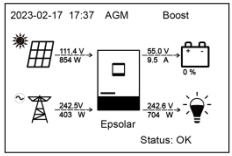
</td><td>❶ When the PV power is greater than load power, the PV charges the battery and supplies extra power to the load.

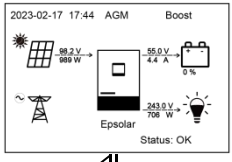
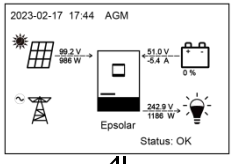
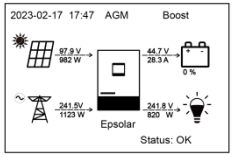
❷ When the PV power is lower than or equal to the load power, the PV will not charge the battery, the battery will cut in to supply power to the load together with the PV.

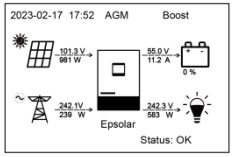
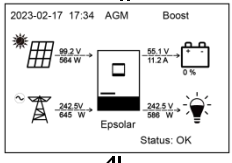
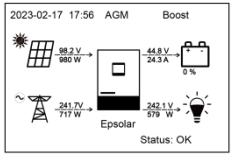
❸ Any of the following is satisfied, the Utility supplies power to the load and the PV charges the battery priority.
• The battery voltage is lower than or equal to the LVD value.
• The battery SOC is lower than or equal to the LED value.</td></tr>
<tr><td colspan="3">Note: When the battery voltage is greater than or equal to the LVR value, or the battery SOC is greater than or equal to the LER value, the working mode returns to state❷.</td></tr>
</table>

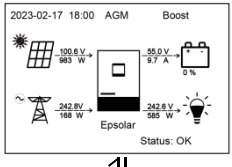
<table>
<tr><td rowspan="2">（C-2）
PV ☑
Utility ☑</td><td>Charging Mode: "Solar"</td><td>Discharging Mode: "BP>PV>BT"</td></tr>
<tr><td>


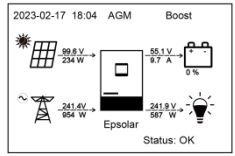
$P_{PV} \le MCC*V_{Bat}$ ⇅ $P_{PV} > MCC*V_{Bat}$
</td><td>❶ When the PV power is lower than or equal to the ($MCC*V_{BAT}$), the Utility supplies power to the load, and the PV charges the battery.</td></tr>
</table>

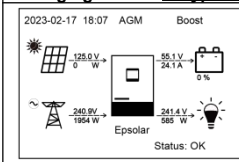
		❷ When the battery voltage reaches to the Boost charging voltage or Equalize charging voltage, and the PV input power is greater than the battery charging power, the Utility and PV supply power to the load, and the PV charges the battery simultaneously.

	Charging Mode: "<u>Solar prior</u>"	**Discharging Mode: "<u>PV>BP>BT</u>" or "<u>PV>BT>BP</u>"**
（C-3） **PV** ☑ **Utility** ☑	 $P_{PV} > P_{Load}$ ⇅ $P_{PV} \le P_{Load}$  $V_{BAT} \ge AOF$ / $S_{BMS} \ge UCF$ ⇅ $V_{BAT} \le AON$ / $S_{BMS} \le UCO$ 	❶ When the PV power is greater than the load power, the PV charges the battery and supplies extra power to the load. ❷ When the PV power is lower than or equal to the load power, the PV will not charge the battery, the battery will cut in to supply power to the load together with the PV. ❸ Any of the following is satisfied, the Utility supplies power to the load and charges the battery together with the PV. • The battery voltage is lower than or equal to the **AON** value. • The battery SOC is lower than or equal to the **UCO** value.
	Note: When the battery voltage is greater than or equal to the **AOF** value, or the battery SOC is greater than or equal to the **UCF** value, the working mode returns to state❷.	

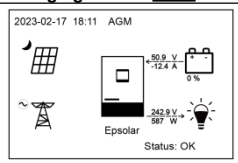
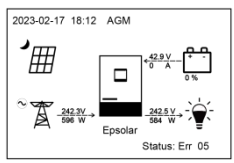
（C-4）	Charging Mode: "Solar prior"	Discharging Mode: "BP>PV>BT"
PV ☑ Utility ☑	 $P_{PV} > MCC*V_{Bat}$ ‖ $P_{PV} \le MCC*V_{Bat}$  $V_{BAT} \ge AOF$ / $S_{BMS} \ge UCF$ ‖ $V_{BAT} \le AON$ / $S_{BMS} \le UCO$  	❶ When the battery voltage reaches to the Boost charging voltage or Equalize charging voltage, and the PV input power is greater than the battery charging power, the Utility and PV supply power to the load, and the PV charges the battery at the same time. ❷ When the PV power is lower than or equal to the (**MCC*** V_{BAT}), the Utility supplies power to the load and the PV charges the battery. ❸ Any of the following is satisfied, the Utility supplies power to the load and charges the battery together with the PV. • The battery voltage is lower than or equal to the **AON** value. • The battery SOC is lower than or equal to the **UCO** value.
	Note: When the battery voltage is greater than or equal to the **AOF** value, or the battery SOC is greater than or equal to the **UCF** value, the working mode returns to state❷.	

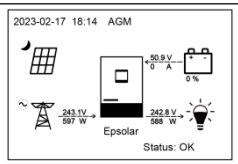
（C-5）	Charging Mode: "Utly & solr"	Discharging Mode: Un-programmable
PV ☑ Utility ☑	 $P_{PV} > MCC*V_{Bat}$ ‖ $P_{PV} \le MCC*V_{Bat}$	❶ When the battery voltage reaches to the Boost charging voltage or Equalize charging voltage, and the PV input power is greater than the battery charging power, the Utility and PV supply power to the load, and the PV charges the battery simultaneously.

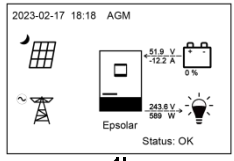
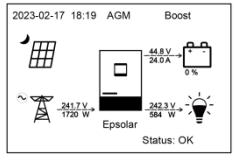
		❷ When the PV power is lower than or equal to the (**MCC*** V_{BAT}), the Utility and PV charge the battery, and the Utility supplies power to the load.

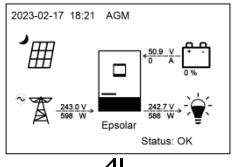
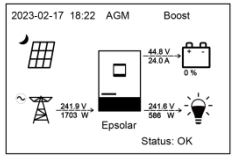
	Charging Mode: "Utltyprior"	**Discharging Mode: Un-programmable**
（C-6） **PV** ☑ **Utility** ☑		The Utility supplies power to the load and charges the battery simultaneously.

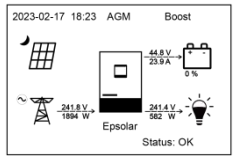
5.2.4 Scenario D: The PV is not available, but the Utility is available.

	Charging Mode: "Solar"	**Discharging Mode: "PV>BT>BP"**
（D-1） **PV** ☒ **Utility** ☑	 $V_{BAT} \geq V_{LVR}$ / $S_{BMS} \geq LER$ ‖ $V_{BAT} \leq V_{LVD}$ / $S_{BMS} \leq LED$ 	❶Any of the following is satisfied, the battery supplies the load. • The battery voltage is greater than or equal to the **LVR** value. • The battery SOC is greater than or equal to the **LER** value. ❷ Any of the following is satisfied, the Utility supplies power to the load. • The battery voltage is lower than or equal to the **LVD** value. • The battery SOC is lower than or equal to the **LED** value.

	Charging Mode: "Solar"	**Discharging Mode: "PV>BP>BT" or "BP>PV>BT"**
（D-2） **PV** ☒ **Utility** ☑		The Utility supplies power to the load.

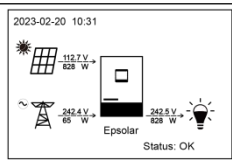
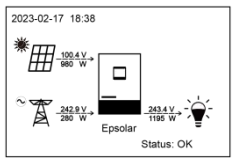
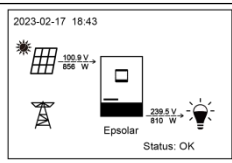
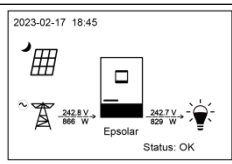
	Charging Mode: "Solar prior"	Discharging Mode: "PV>BT>BP"
（D-3） PV ☒ Utility ☑	 $V_{BAT} \geq AOF$ / $S_{BMS} \geq UCF$ ⇅ $V_{BAT} \leq AON$ / $S_{BMS} \leq UCO$ 	❶Any of the following is satisfied, the battery supplies the load. • The battery voltage is higher than or equal to the **AOF** value. • The battery SOC is greater than or equal to the **UCF** value. ❷Any of the following is satisfied, the Utility supplies power to the load and charges the battery simultaneously. • The battery voltage is lower than or equal to the **AON** value. • The battery SOC is lower than or equal to the **UCO** value.

	Charging Mode: "Solar prior"	Discharging Mode: "PV>BP>BT" or "BP>PV>BT"
（D-4） PV ☒ Utility ☑	 $V_{BAT} \geq AOF$ / $S_{BMS} \geq UCF$ ⇅ $V_{BAT} \leq AON$ / $S_{BMS} \leq UCO$ 	❶Any of the following is satisfied, the Utility supplies power to the load. • The battery voltage is greater than or equal to the **AOF** value. • The battery SOC is greater than or equal to the **UCF** value. ❷Any of the following is satisfied, the Utility supplies power to the load and charges the battery simultaneously. • The battery voltage is lower than or equal to the **AON** value. • The battery SOC is lower than or equal to the **UCO** value.

（D-5） PV ☒ Utility ☑	**Charging Mode: "Utly & solr" or "Utltyprior"** 	**Discharging Mode: Un-programmable** The Utility supplies power to the load and charges the battery simultaneously.

5.3 No battery mode

Note: Under the no battery mode, the "Charging Mode" and "Discharging Mode" settings will not take effect.In no battery mode, the maximum load power is about 80% of the PV power when the PV is loaded.

PV ☑ Utility ☑	 $P_{PV} > P_{Load}$ ⇅ $P_{PV} \leq P_{Load}$ 	❶When the PV power is greater than the load power; the PV supplies power to the load. **Note: The Utility still keep a minimum power input. When the PV power is lower than the load power, the Utility can replenish the power supply at any time to avoid device shutdown.** ❷When the PV power is lower than or equal to the load power, the PV and the Utility supply power to the load together.
PV ☑ Utility ☒		Only the PV supplies power to the load.
PV ☒ Utility ☑		Only the Utility supplies power to the load.

6 Protections

No.	Protections	Instruction	
1	PV limit Current/ Power	When the PV array's actual charging current/power exceeds its rated current/power, it will charge the battery as per the rated current/power.	
2	PV short circuit	When the PV is not charging and short circuit, the inverter/charger is not damaged.	
3	PV reverse polarity	Fully protect against PV reverse polarity, correct the wire connection to resume normal operation. ⚠ **CAUTION:** If the (PV open-circuit voltage plus battery voltage) ≥ 200V, the inverter/charger will be damaged.	
4	Night reverse charging	Prevent the battery from discharging through the PV module at night.	
5	Utility input overvoltage	When the utility voltage exceeds 285V, the utility stops charging the battery and supplying the load.	
6	Utility input under-voltage	When the utility voltage is lower than 170V, the utility stops charging the battery and supplying the load.	
7	Utility overload	1.5*Rated power to 2.5*Rated power	2.5*Rated power to 3*Rated power
		Protect after 10 seconds	Protect after 5 seconds
		The output is recovered automatically after a delay time of 5s, 10s, and 15s separately (less than three times recovery within 5 minutes, it will be recounted). The inverter/charger stops working after the 4th protection and can resume working after resetting or restarting.	
8	Utility over current	3*Rated power	
		Protect immediately	
		The output is recovered automatically after a delay time of 5s, 10s, and 15s separately (less than three times recovery within 5 minutes, it will be recounted). The inverter/charger stops working after the 4th protection and can resume working after resetting or restarting.	
9	Battery reverse polarity	Fully protected against reverse battery polarity; no damage will occur to the battery. Correct the miswire to resume operation. ⚠ **CAUTION:** Limited to the characteristic of lithium battery, when the PV connection is correct and the battery connection reversed, the inverter/charger will be damaged.	

<table>
<tr><th>No.</th><th>Protections</th><th colspan="3">Instruction</th></tr>
<tr><td>10</td><td>Battery overvoltage</td><td colspan="3">When the battery voltage goes higher than the [Over Voltage Disconnect Voltage], the inverter/charger will stop charging the battery to protect the battery from being over-charged.</td></tr>
<tr><td>11</td><td>Battery over-discharge</td><td colspan="3">When the battery voltage goes lower than the [Low Voltage Disconnect Voltage], the inverter/charger will stop discharging the battery to protect the battery from being over-discharged.</td></tr>
<tr><td>12</td><td>Battery low/high temperature</td><td colspan="3">The inverter/charger reserves the battery temperature sensor port. It will stop charging/discharging the battery when the battery temperature is higher than the over-temperature protection value or lower than the low-temperature protection value. This function ensures the battery safety and extends the battery life.</td></tr>
<tr><td>13</td><td>DC bus overvoltage</td><td colspan="3">The internal DC bus voltage is too high, which may be caused by the high battery input voltage or overcharging voltage. The inverter/ charger will stop charging. Close the battery input and the AC output to prevent the damage of the inverter/charger.</td></tr>
<tr><td>14</td><td>Load output short circuit</td><td colspan="3">The output is turned off immediately in the occurrence of short-circuiting. And then, the output is recovered automatically after a delay time of 5s, 10s, and 15s separately (less than three times recovery within 5 minutes, it will be recounted). The inverter/charger stops working after the 4th protection and can resume working after resetting or restarting.
Enter the "5.Parameters Set" interface according to chapter 2.4.3 Administrator interface. Then click the "UP/DOWN" button to select “Fault reset,” and to click ENTER to exit the current fault alarm status and restore normal working.</td></tr>
<tr><td rowspan="3">15</td><td rowspan="3">Load output overload</td><td>1.27*Rated power to 1.5*Rated power</td><td>1.5*Rated power to 2*Rated power</td><td>Above 2* Rated power</td></tr>
<tr><td>Protect after 10 minutes</td><td>Protect after 5 seconds</td><td>Protect immediately</td></tr>
<tr><td colspan="3">The output is recovered automatically after a delay time of 5s, 10s, and 15s separately (less than three times recovery within 5 minutes, it will be recounted). The inverter/charger stops working after the 4th protection and can resume working after resetting or restarting.</td></tr>
</table>

No.	Protections	Instruction
16	Device overheating	When the internal temperature overheats, the inverter/charger will stop charging/discharging. The inverter/charger will resume charging/discharging when the internal temperature is normal and the protection time lasts more than 20 minutes.

7 Troubleshooting

CAUTION	After the inverter/charger is powered on, the meter displays the boot screen all the time (unable to enter the home screen) and the red "RUN" indicator flashes. It means the communication with the inverter/charger is error. When the above fault occurs, check whether the communication cable is disconnected. If not, don't hesitate to contact our after-sales engineer.

7.1 Battery faults

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
1	Bat Error (Battery error)	Err05	No indicator (The inverter error accompanies the battery error.)	--	This fault will occur simultaneously with one or more other items of the "battery faults." Please refer to the solutions for other items.
2	BatOC (Battery over current)	Err36		--	Check whether the actual charging and discharging current of the battery exceeds the set values of "battery limit charging current" and "battery limit discharging current."
3	BatOTP (Battery over temperature protect)	Err52		Intermittent beeps for 20s	Ensure the inverter/charger is placed in a cool and well-ventilated place. Resume normal charging and discharging control after the battery cools down to below the "battery over temperature protect recover" for 20 minutes.

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
4	BatOV (Battery over-voltage)	Err55	No indicator (The inverter error accompanies the battery error.)	--	Disconnect the PV and Utility, and test if the voltage at the additional battery port is too high, or test if the setting value of the battery's "over voltage disconnect voltage" is too low.
5	BatOverDischage (Battery over dischage)	Err56		Intermittent beeps for 20s	After connecting to PV or Utility, charge the battery above the "low voltage reconnect voltage". Note: when disconnecting the PV, if the battery cannot be charged by the Utility after it is over-discharged (below 35V), please contact our dealer or our technical support.
6	LowTemProDischg (Low temperature prohibit discharge)	Err102		Intermittent beeps for 20s	After the Lithium battery protects, the battery temperature will be lower than the set value. Resume normal charging and discharging control after modifying the set value or the battery temperature rising above the set value for 20 minutes.
7	LowTemProCharge (Low temperature prohibit charge)	Err103		Intermittent beeps for 20s	

①The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

②Set the "BuzzerAlert" as "ON", the buzzer will sound when a fault occurs. After the fault is eliminated, the buzzer will automatically mute. If the "BuzzerAlert" is set as "OFF," even if a fault occurs, the buzzer will not sound.

Note: the "BuzzerAlert" defaults to "ON".

7.2 PV faults

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
1	PV Error 1 PV Error 2 PV Error 3	Err00 Err01 Err02	PV indicator red on	--	This fault will occur simultaneously with one or more other items of the "PV faults." Please refer to the solutions for other items.
2	PV1 OC (PV1 over current) PV2 OC (PV2 over current) PV3 OC (PV3 over current)	Err21 Err22 Err23		--	Check if the PV input power exceeds the maximum PV input power allowed by the inverter/charger.
3	PV1ConectReverse (PV1 connect reverse) PV2ConectReverse (PV2 connect reverse) PV3ConectReverse (PV3 connect reverse)	Err64 Err68 Err72		Intermittent beeps for 20s	Check the polarity of the PV input and connect according to the PV input identification.
4	PV1OV (PV1 input over-voltage) PV2OV (PV2 input over-voltage) PV3OV (PV3 input over-voltage)	Err65 Err69 Err73		Intermittent beeps for 20s	Check if the open circuit voltage of the PV exceeds the maximum PV input voltage allowed by the inverter/charger.

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
5	PV1OCS (PV1 soft over current) PV2OCS (PV2 soft over current) PV3OCS (PV3 soft over current)	Err66 Err70 Err74	PV indicator red on	--	Check if the PV input power exceeds the maximum PV input power allowed by the inverter/charger.
6	PV Inequality	Err39		Intermittent beeps for 20s	Check if the connection method of PV components is consistent with the setting of PV mode. If not, correct it and restart the inverter/charger.
7	PV Mode Error	Err77		Intermittent beeps for 20s	

①The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

②Set the "BuzzerAlert" as "ON," the buzzer will sound when a fault occurs. After the fault is eliminated, the buzzer will automatically mute. If the "BuzzerAlert" is set as "OFF," even if a fault occurs, the buzzer will not sound.

Note: the "BuzzerAlert" defaults to "ON".

7.3 Inverter faults

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
1	Inv Error (Inverter error)	Err04	LOAD indicator red ON	--	This fault will occur simultaneously with one or more other items of the "Inverter faults". Please refer to the solutions for other items.
2	InvLVSft_OC (Inverter low voltage soft over current)	Err33		--	Check if the load actual power exceeds the “Continuous output power (see chapter 9, Specifications)”, disconnect the load completely and turn off the inverter/charger. Wait 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our dealer or our technical support.
3	Inv_LV OC (Inverter low voltage over current)	Err19		Intermittent beeps for 20s	
4	InvNSft_OC (Inverter output N soft over current)	Err34		Intermittent beeps for 20s	
5	InvL2Sft_OC (Inverter output L2 soft over current)	Err35		Intermittent beeps for 20s	
6	Inv_L1L2 OV (Inverter L1-L2 over-voltage)	Err18		Intermittent beeps for 20s	Disconnect the load completely and turn off the inverter/charger. Wait 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our dealer or our technical support.
7	InvOutOV (Inverter output over-voltage)	Err45		Intermittent beeps for 20s	
8	InvAcOverLoad (Inverter AC output overload)	Err49		Intermittent beeps for 20s	Check if the load actual power exceeds the “Continuous output power(see chapter 9, Specifications)”, disconnect the load completely and turn off the inverter/charger. Wait 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our dealer or our technical support.
9	InvNOutOverLoad (Inverter N output overload)	Err51		Intermittent beeps for 20s	
10	InvOutUV (Inverter output under voltage)	Err76		Intermittent beeps for 20s	

①The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD

only displays the fault code with the smallest value.

②Set the "BuzzerAlert" as "ON," the buzzer will sound when a fault occurs. After the fault is eliminated, the buzzer will automatically mute. If the "BuzzerAlert" is set as "OFF," even if a fault occurs, the buzzer will not sound.

Note: the "BuzzerAlert" defaults to "ON".

7.4 Utility faults

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
1	Utility Error	Err06	LOAD indicator red ON	--	This fault will occur simultaneously with one or more other items of the "Utility faults". Please refer to the solutions for other items.
2	UtilitySft_OC (Utility soft over current)	Err32		Intermittent beeps for 20s	Check if the load actual power exceeds the “Rated Utility input power (see chapter 9, Specifications)”, disconnect the load completely and turn off the inverter/charger. Wait 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our dealer or our technical support.
3	UtilityOverLoad (Utility overload)	Err38		Intermittent beeps for 20s	
4	UtilityOverVolt (Utility over-voltage)	Err40		--	Check if the utility voltage is normal (i.e. within the “Utility work voltage range (see chapter 9, Specifications)”).
5	UtilityUnderVolt (Utility under voltage)	Err41		--	
6	UtilityOverFreq (Utility over frequency)	Err42		--	Check if the utility frequency is normal (i.e. within the “Utility input frequency range (see chapter 9, Specifications)”). Note: Restart the inverter/charger after modifying the Utility frequency protection value, otherwise this fault may occur.
7	UtilityUnderFreq (Utility under frequency)	Err43		--	

①The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

②Set the "BuzzerAlert" as "ON," the buzzer will sound when a fault occurs. After the fault is eliminated, the buzzer will automatically mute. If the "BuzzerAlert" is set as "OFF," even if a fault occurs, the buzzer will not sound.

Note: the "BuzzerAlert" defaults to "ON".

7.5 Load faults

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
1	Load Error	Err07	LOAD indicator red ON	--	This fault will occur simultaneously with one or more other items of the "Load faults." Please refer to the solutions for other items.
2	Load_L1L2 OV (Load L1-L2 over-voltage)	Err16		Intermittent beeps for 20s	Disconnect the load completely and turn off the inverter/charger. Wait 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our dealer or our technical support.
3	LoadL1L2OV (Load L1-L2 over-voltage)	Err46		Intermittent beeps for 20s	
4	LoadL1NOV (Load L1-N over-voltage)	Err47		Intermittent beeps for 20s	

①The fault/status code is displayed at the "Status" column at the bottom right corner of the LCD interface. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

②Set the "BuzzerAlert" as "ON"; the buzzer will sound when a fault occurs. After the error is eliminate, the buzzer will automatically mute. If the

"BuzzerAlert" is set as "OFF," even if a fault occurs, the buzzer will not sound.

Note: the "BuzzerAlert" defaults to "ON".

7.6 Other faults for single inverter/charger

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
1	TZError	Err25	LOAD indicator red ON	--	Check if the load is short circuited or if the power exceeds the allowable output power of the inverter/charger, or if the input voltage of the battery exceeds the allowable input range of the inverter/charger.
2	UdcOV (Udc over voltage)	Err37		--	Disconnect the PV and Utility, and test if the voltage at the additional battery port is too high, or test if the setting value of the battery's "over voltage disconnect voltage" is too low. Note: During the charging process, it is normal for the fault to be triggered if the battery disconnects from the device.
3	Heat Sink OT (Heat sink over temperature protect)	Err48		Intermittent beeps for 20s	Ensure the inverter/charger is installed in a cool and well-ventilated place.
4	Environment OT (Environment over temperature protect)	Err50		Intermittent beeps for 20s	Run in the working environment allowed by the inverter/charger.
5	ParamSetError (Parameter set error)	Err57	--	--	Reset the operating parameters as required after resetting the inverter/charger to the factory settings.
6	DspComError (DSP communication error)	Err58	RUN indicator red ON	--	Restart the inverter/charger, if it is still abnormal, please contact our dealer or our technical support.

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
7	Transformer OT (Transformer over temperature)	Err60	LOAD indicator red ON	--	Ensure the inverter/charger is installed in a cool and well-ventilated place.
8	VBUSOSC (Voltage bus oscilating)	Err79	--	--	When the bus voltage fluctuates above the under-voltage point by more than 4.5V three times, it is determined as VBUSOSC (Voltage bus oscilating), and it will return to normal operation after 5 minutes.

①The fault/status code is displayed at the "Status" column at the bottom right corner of the LCD interface.When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

②Set the "BuzzerAlert" as "ON"; the buzzer will sound when a fault occurs. After the error is eliminate, the buzzer will automatically mute. If the "BuzzerAlert" is set as "OFF," even if a fault occurs, the buzzer will not sound.

Note: the "BuzzerAlert" defaults to "ON".

7.7 Parallel faults

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
1	CAN communication failure	Err80	LOAD indicator red ON	Intermittent beeps for 20s	Check if the parallel connection cable and the CAN communication (USB-A 3.0 port) are securely connected.
2	PhaseLoss Error (Phase loss error)	Err81			Check if the phase setting of the inverter/charger is correct. If not, correct it and restart the inverter/charger.
3	UnSet Phase (Unset phase)	Err82			
4	CurrntUnbalance (Three-phase current unbalance error)	Err83			Check if the “UnbalanceValue (Current unbalance value)” matches the actual current difference of each phase’s loads. If the output terminal is connected to a three-phase unbalanced load, modify the “UnbalanceValue (Current unbalance value)” or disable the “UnbalanceSet (Current unbalance set).”
5	Load relay adhesion	Err84			Check if the parallel connection cable and the CAN communication (USB-A 3.0 port) are securely connected.
6	Volt Set Error	Err85			
7	SyncSend Error (Sync signal sending error)	Err86			
8	SyncRecv Error (Sync signal receiving error)	Err87			

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
9	PhaseCAP Error (Utility phase capture error)	Err88	LOAD indicator red ON	Intermittent beeps for 20s	Check if the frequency and voltage of the Utility fluctuate excessively.
10	VoltTrace Error (Utility voltage tracing error)	Err89			
11	BatInconsistent (Battery mode inconsistent)	Err90			Check the battery status and settings of the host and slave inverter/chargers, and then restart the slave devices.
12	DischgeCLError (Parallel discharging current limit error)	Err92			Check if the set “PARDisChageCurent (Parallel discharge current)” matches the loads, and set this parameter according to the situation.
13	Type Error (Product type error)	Err93			Check if different product types are connected in the parallel system.
14	ParalOverLoad (Parallel output overload)	Err95			Check if the actual load power exceeds the "Continuous output power (see chapter 9, Specifications) of the parallel connection.
15	OtherUtilityWarn (Other equipment Utility warn)	Err96			Check if the Utility connection of each inverter/charger is correct.
16	OtherPhaseCAPWrn (Other phase capture warn)	Err97			

No.	Fault/Status	Error code①	Indicator	Buzzer②	Solution
17	BatInconsistent (Battery mode inconsistent)	Err98	LOAD indicator red ON	Intermittent beeps for 20s	Check the battery status and settings of the host and slave inverter/chargers, and then restart the slave devices.
18	LocalPhaseCAPErr	Err99			Check if the parallel connection cable and the CAN communication (USB-A 3.0 port) are securely connected.

①The fault/status code is displayed at the "Status" column at the bottom right corner of the LCD interface.When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

②Set the "BuzzerAlert" as "ON"; the buzzer will sound when a fault occurs. After the error is eliminate, the buzzer will automatically mute. If the "BuzzerAlert" is set as "OFF," even if a fault occurs, the buzzer will not sound.

Note: the "BuzzerAlert" defaults to "ON".

7.8 BMS faults

No.	Fault/Status	Error code①	Indicator	Buzzer	Solution
1	BMS OVP (BMS over voltage protect)	Err114	--	--	Check the BMS communication status or BMS setting parameters.
2	BMS Chage TEMP ERR (BMS charge temperature error)	Err116			
3	BMS UVP (BMS under voltage protect)	Err117			
4	BMS DisChageTEMP ER (BMS discharge temperature error)	Err119			
5	BMSComError (BMS communication error)	Err122			This fault occurs when the “BMS Valid/Invalid” is set as “Valid,” but the BMS is not connected or the BMS communication is abnormal. Check whether the BMS communication cable is virtual or not connected, if the fault still exists, please contact our dealer or our technical support.

①The fault/status code is displayed in the “Status” column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

8 Maintenance

The following inspections and maintenance tasks are recommended at least twice yearly for best performance.

- Make sure no block on airflow around the inverter/charger. Clear up dirt and fragments on the radiator.
- Check all the wired cables to ensure insulation is not damaged for serious solarization, frictional wear, dryness, insects or rats, etc. Repair or replace some wires if necessary.
- Check and confirm that LED or LCD is consistent with the required. Pay attention to any troubleshooting or error indication. Take necessary corrective action.
- Confirm that all the terminals have no corrosion, insulation damage, high temperature, or burnt/discolored sign; tighten terminal screws to the suggested torque.
- Check for dirt, nesting insects, and corrosion. If so, clear up in time.
- Check and confirm that the lightning arrester is in good condition. Replace a new one in time to avoid damaging the inverter/charger and other equipment.

 **WARNING**	Risk of electric shock! Turn off all the power before the above operations and follow the corresponding inspections and operations.

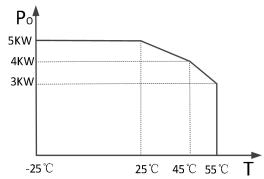
9 Specifications

Model	MP3043-1020P65	MP5043-1020P65
Rated battery voltage	48VDC	
Battery work voltage range	42.4VDC to 64.0VDC	
Battery type	Lithium battery/lead-acid battery	
Inverter output		
Continuous output power(@25℃/4H)	3000W	5000W
5S Continuous output power (@25℃)	6000W	10000W
Rated output voltage	220VAC/230VAC/240VAC±5%; 110VAC/115VAC/120VAC±5%	
Rated output frequency	50Hz/60Hz±0.5Hz	
Output wave	Pure Sine Wave	
Load power factor	0.2－1(VA ≤ continuous output power)	
Distortion THD	≤ 5% (Resistive load)	
Max. inverter efficiency	＞93.6%	
Full load efficiency	＞90%	
Utility transfer time	≤10mS	≤10mS
Inverter to bypass transfer time	≤1mS	≤1mS
Utility input		
Utility work voltage range	170VAC to 285VAC	
Utility input frequency range	40Hz to 70Hz	
Rated Utility input power (Charging plus Bypass)	4500W(@240VAC)	7500W(@240VAC)
Utility charging power factor	About 1	
Max. Utility charging current	50A	80A
Solar charging		
Max. PV open circuit voltage	195V (At minimum operating environment temperature) 180V (At 25℃)	
MPPT working voltage	(Battery voltage plus 10V) to 145V	
Max. PV charging power	5000W (1700W/way)	
Max. PV charging current	100A (34A/way)	
MPPT tracking efficiency	≥99.5%	
Charging conversion efficiency	＞95%	
Temperature compensate coefficient	-3mV/℃/2V (Default)	
Inverter/charger charging current		
Max. inverter/charger charging current	Default 100A (Settable, range 0－100A)	
Others		
No-load consumption	≤ 48V/ 0.7A	

Model	MP3043-1020P65	MP5043-1020P65
Static consumption	≤ 48V/ 0.15A	
Enclosure	IP65	
Relative humidity	< 95% (N.C.)	
Altitude	4000m (If the altitude exceeds 2000 meters, the actual output power is reduced appropriately)★	
Work temperature	-20℃ to 55℃ (When the environment temperature exceeds 25℃, the actual output power is reduced appropriately)★	
Storage temperature	-40℃ to 60℃	
Mechanical parameters		
Dimension (Length x Width x Height)	848mm×435mm×249mm	935mm×475mm×255mm
Mounting size (Length x Width)	260mmx160mm	260mmx160mm
Mounting hole size	Φ10mm	Φ10mm
Net Weight	52.0kg	66.0kg

★Instruction for inverter/charger actual output power reducing

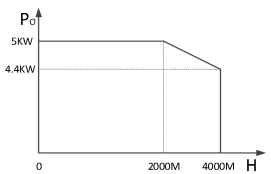
1. The actual output power is reduced with the temperature: 25℃ to 45℃, the load will be reduced by 50W for each 1℃; 45℃ to 55℃, the load will be reduced by 100W for each 1℃ increase.



Note: the reduction requires manual operation. The unreduced use of the device may enter the high temperature protection, and the output will be restored automatically after the temperature recovery and the protection time is over 20min.

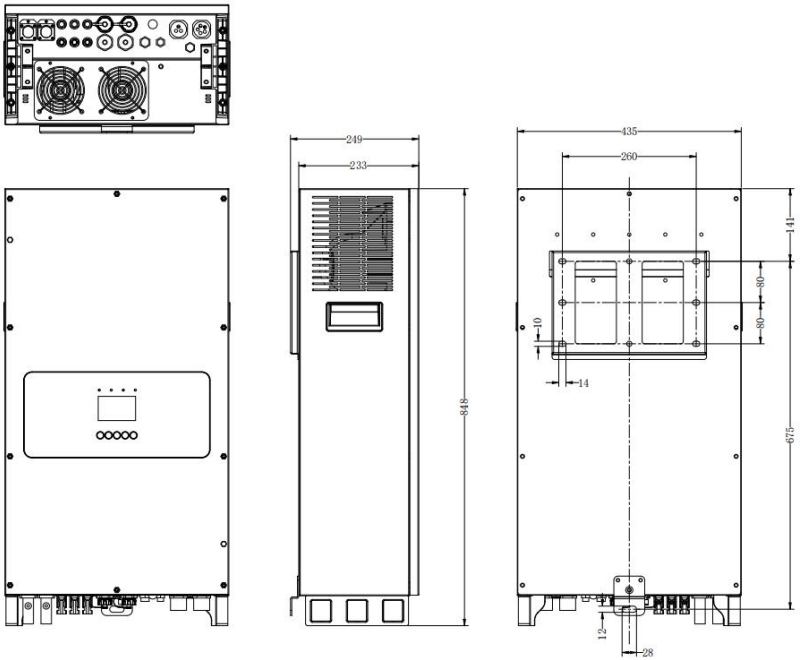
2. The actual output power is reduced with the PV: 25℃ to 55℃, the max. charging current will be reduced by 1A for each 1℃.

3. The actual output power is reduced with the altitude: When the altitude height is over 2000m, the actual output power will be reduced by 10%. The following picture is shown as the example of MP5043-1020P65:

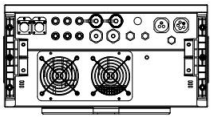


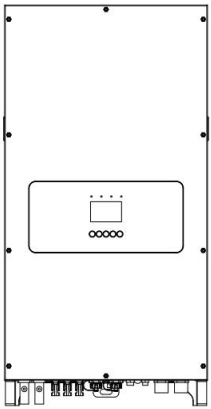
10 Dimensions

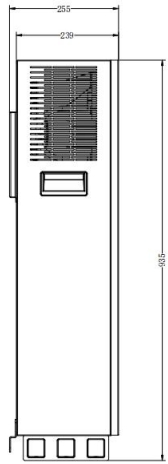
Model: MP3043-1020P65 (Unit: mm)

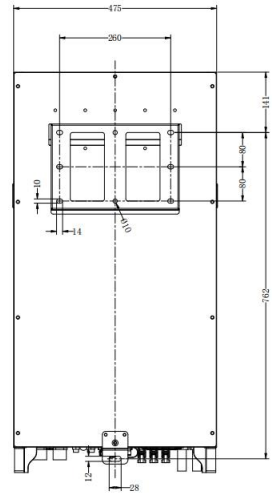


Model: MP5043-1020P65 (Unit: mm)









Any changes without prior notice! Version number: V2.0

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